



The
Journal of Agriculture.

WELLINGTON, NEW ZEALAND.

20TH FEBRUARY, 1918.

TESTING OF PUREBRED DAIRY COWS.

THE CERTIFICATE-OF-RECORD SYSTEM IN 1917.

W. M. SINGLETON, Assistant Director, Dairy Division.

THE support accorded by the breeders of purebred dairy cattle to the certificate-of-record testing system during the year under review evidences an effort that must produce a most salutary influence on the economic position in New Zealand. Although, for reasons well known, labour difficulties have become more acute, breeders have come forward in increasing numbers to join this activity, which is primarily directed toward the improvement of our dairy stock.

It must be recognized that this testing-work makes considerable demands on the owner's time, and that breeders have experienced handicaps known only to the initiated. A more experienced attendant is necessary for high-quality cows such as are usually entered for test. At a number of breeders' dairies test cows are milked thrice daily. The extra work required of breeders and their staffs, in addition to the difficulty of procuring concentrated foodstuffs and the high cost of same when procurable, constitutes sufficient evidence that the testing breeders are measuring up to their responsibilities.

It is encouraging that the number of breeders now testing cows shows an increase of 20 per cent. over the number testing a year since. Had sufficient assistance on the testing staff been available this percentage could have been increased to 25 per cent., for a number of applications for testing from breeders could not be accepted.

CERTIFICATES ISSUED.

During last year certificates were issued on the production of 181 cows and heifers not previously tested, and to thirty cows which had previously been granted certificates. The Department has now granted certificates on the production of 805 stud cows and heifers, while eighty-five certificates have been granted on retests. The following table shows the number of certificates issued during each calendar year since the inception of the system :—

Breed.	1913.	1914.		1915.		1916.		1917.	
		Ordinary.	Repeat.	Ordinary.	Repeat.	Ordinary.	Repeat.	Ordinary.	Repeat.
Jersey ..	67	104	14	91	3	94	11	94	13
Friesian ..	48	67	11	62	9	44	5	62	14
Ayrshire ..	..	17	1	12	1	9	..	4	3
Shorthorn ..	..	..	..	2	..	7	..	21	..
Totals ..	115	188	26	167	13	154	16	181	30

We recognize that this work is merely in its infancy, and that it is destined to make rapid growth if favoured with normal conditions. Not a sufficient proportion of the breeders are yet possessed of a due appreciation of the work, and not a sufficient percentage of our dairy herds are yet headed by a purebred butter-fat-record dairy bull. With the extension of education among dairy-farmers, and the synchronizing development of purebred dairy cattle, we should not even be satisfied when the annual output of certificates is as great as the number issued since the inception of the system. The growth of dairy husbandry in New Zealand suggests that for many years to come the scope for this work will be unlimited.

FRIESIANS.

The number of certificates issued for Friesians this season includes eleven forwarded to Mr. Grigg, of Longbeach, on the production of his cows tested prior to 1917. The issue of these was delayed through Mr. Grigg's absence from the Dominion. The figures of the eleven cows referred to are included in the averages for the year under review. During the year sixty-two certificates were issued on first records, and fourteen on retests.

Class-leaders.

Three of the seven class-leaders at the end of 1916 have been superseded during 1917. Friesland Park Butter-girl, with a C.O.R. for 553.21 lb. butter-fat, has raised the last year's junior two-year-old championship record of Lady of Cliffside II from 535.22 lb. fat. Burkeyje Sylvia Posch finished her year's test in the junior four-year-old class with a credit of 679.86 lb. fat, thereby displacing Meta, the previous champion. Burkeyje Sylvia Posch is making Friesian history by virtue of her successive high records. She is now in her fourth milking season, which was started at the age of 5 years 113 days. Commencing with the first season, her three consecutive seasons'



OAKWOOD TOPSY (FRIESIAN MATURE CLASS).

Yield, 16,607 lb. milk, 693.66 lb. fat; standard, 350 lb. fat.

credits are 505.27 lb., 610.42 lb., and 679.86 lb. fat respectively. In her fourth season up to the end of December she had been milking 189 days, and had then produced 13,714.4 lb. milk containing 474.68 lb. fat. She was bred in Canada, and is owned and has been developed by Messrs. H. North and Sons, of Omimi, Dunedin.

During the year under review Salma Johanna Lyons changed the leadership of the senior four-year-old class with her premier milk-production of 21,439.8 lb. containing 730.19 lb. fat. She replaces as leader Grace Fayne II of Ashlynn, who has a credit of 716.05 lb. fat. Salma's record placed her as New Zealand's champion milk-cow, and this position she retained until the end of the year.

The Friesian class-leaders for the last two years are as follows:—

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
1917.						
<i>Junior Two-year-old.</i> Friesland Park Butter-girl	W. McLachlan, Doyleston	Yrs. d. y. s. 2 13 1	lb. 253·6	365	lb. 13,966·20	lb. 553·21
<i>Senior Two-year-old.</i> Netherland Princess IV	John Donald, Westmere	2 34 1	274·6	365	19,621·60	805·77
<i>Junior Three-year-old.</i> Ethel of Friesland Park	F. W. Koberstein, Taonui	3 37	280·7	365	17,663·20	638·85
<i>Senior Three-year-old.</i> Manor Beets Daughter II of Ashlynn	C. A. Hopping, Palmerston North	3 29 6	306·6	365	18,733·90	863·51
<i>Junior Four-year-old.</i> Burkeyje Sylvia Posch	H. North and Sons, Omimi	4 69	320·4	365	20,016·70	679·86
<i>Senior Four-year-old.</i> Salma Johanna Lyons	W. Barton, Featherston	4 32 2	345·7	365	21,439·80	730·19
<i>Mature.</i> Holland Queen ..	A. J. Gallichan, Tiakitahuna	5 52	350·0	365	20,629·90	755·78
1916.						
<i>Junior Two-year-old.</i> Lady of Cliffside II ..	W. I. Lovelock, Palmerston North	2 11 7	252·2	365	16,320·50	535·22
<i>Senior Two-year-old.</i> Netherland Princess IV	John Donald, Westmere	2 34 1	274·6	365	19,621·60	805·77
<i>Junior Three-year-old.</i> Ethel of Friesland Park	F. W. Koberstein, Taonui	3 37	280·7	365	17,663·20	638·85
<i>Senior Three-year-old.</i> Manor Beets Daughter II of Ashlynn	C. A. Hopping, Palmerston North	3 29 6	306·6	365	18,733·90	863·51
<i>Junior Four-year-old.</i> Meta	George Aitchison, Kaitangata	4 24	315·9	346	18,285·75	675·06
<i>Senior Four-year-old.</i> Grace Fayne of Ashlynn	C. A. Hopping, Palmerston North	4 30 2	343·7	351	17,934·00	716·05
<i>Mature.</i> Holland Queen ..	A. J. Gallichan, Tiakitahuna	5 52	350·0	365	20,629·90	755·78

Class-averages.

During the year certificates have been issued for eight Friesian records of production exceeding 600 lb. of butter-fat, one of these being that of Friesland Tirania, with a credit for 706·55 lb. fat, in the senior three-year-old class. Three of the class-averages evidence an

increase over the preceding season. The complete figures for the two years are as follows :—

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
1917.				
Junior two-year-old ..	12	346	9,887.60	353.73
Senior two-year-old ..	11	323	9,655.90	326.08
Junior three-year-old ..	4	361	12,797.10	455.98
Senior three-year-old ..	4	343	13,711.84	480.37
Junior four-year-old ..	9	353	13,615.90	475.72
Senior four-year-old ..	6	359	17,250.00	601.57
Mature	30	333	14,123.04	495.08
1916.				
Junior two-year-old ..	16	351	10,978.78	390.40
Senior two-year-old ..	7	357	11,525.63	416.91
Junior three-year-old ..	8	328	13,193.40	448.17
Senior three-year-old ..	5	332	14,369.40	494.50
Junior four-year-old ..	2	300	14,733.67	508.09
Senior four-year-old ..	5	325	12,103.68	407.98
Mature	6	342	13,561.79	492.76

C.O.R. Bulls.

Four Friesian bulls qualified during the year for our special list on the requirement of having four C.O.R. daughters each from a different dam. At the beginning of 1917 there were fifteen C.O.R. bulls of the breed, and during the year nine of these had their credit increased through additional daughters qualifying for certificates. The four bulls which qualified during the year thus bring the total to nineteen, and daughters of these total 146 of the 283 C.O.R. Friesian cows to date.

The names of the C.O.R. Friesian bulls, together with the number of their C.O.R. daughters and increases during the year, are as follows :—

Name of Bull.	Total of C.O.R. Daughters.	Number of Daughters qualified during 1917.	Name of Bull.	Total of C.O.R. Daughters.	Number of Daughters qualified during 1917.
Cliffside Laddie ..	14	3	Colonel Manor of Riverside	6	1
Sir de Kol Inka Pietertje	13	..	Mutual Piebe de Kol	6	..
King Segis Wild Rose Homestead	12	2	Netherland King ..	4	..
Kruger II ..	12	6	Colantha Johanna Lad Pietertje Boy ..	4	..
Nazli de Kol ..	10	..	*King Fayne Segis II	4	1
Grace's Netherland of Riverside	10	1	*Dominion de Kol Domino ..	5	5
Paul Pietertje ..	9	1	*Longbeach Dutchman	4	1
Longbeach Van Tromp	9	3	*Oak de Kol II Homestead Fobes	5	2
De Kol Pontiac Burke	8	2			
Edinglassie ..	7	2			

* Qualified during 1917.

JERSEYS.

Jersey cattle were entered for testing in greater numbers than representatives of other breeds, and account for more than half the certificates issued during the past year. The Jersey Cattle-breeders' Association have divided the previously existing class for animals under three years of age into two classes. The junior class includes all animals commencing test under 2 years 93 days, and the senior class includes all animals commencing at or above this age and under three years.



WOODSTOCK'S BABY (JERSEY JUNIOR TWO-YEAR-OLD CLASS).

Yield, 9,645.5 lb. milk, 514.04 lb. fat; standard, 240.5 lb. fat.

Class-leaders.

The addition of the extra class means the selection of a new class-leader, and the honour falls to Lady Peggy for the senior two-year-old class. Her record of 9,625.5 lb. milk containing 650 lb. butter-fat was completed in 1916, and was commenced at the age of 2 years 357 days.

The class for three-year-olds is also honoured with a change in leadership. Sultan's Clematis has produced a credit of 641.29 lb. fat, and thus replaces Belvedere Sungleam—the latter cow having a credit for 626.46 lb. fat.

In the mature class Sultan's Daisy produced the highest record for the year with a credit of 10,364.3 lb. milk containing 667.31 lb.

fat. The similarity between the name of this cow and that of the new leader of the three-year-old class must not be taken as suggesting relationship. Sultan's Daisy is sired by the imported bull Campanile's Sultan, while Sultan's Clematis is sired by Sultan Lord, a grandson of the two bulls K.C.B. and Starbright. Sultan's Clematis is in fact a line-bred K.C.B. Cow. Although Sultan's Daisy has made a creditable performance, she does not displace the class-leader Madam Mayflower.

The 1917 and 1916 Jersey class-leaders are shown in the following table :—

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
1917.						
<i>Junior Two-year-old.</i>		Yrs. d.ys.	lb.		lb.	lb.
Mere	F. S. McRae, Palmers- ton	1 346	240·5	365	12,164·00	663·64
<i>Senior Two-year-old.</i>						
Lady Peggy ..	E. Griffiths, New Ply- mouth	2 357	276·2	365	9,625·50	650·00
<i>Three-year-old.</i>						
Sultan's Clematis ..	Percy Jones, Woodville	3 344	311·4	365	11,508·30	641·29
<i>Four-year-old.</i>						
Lady of Collingwood	F. E. Hellyer, Dunedin	4 86	322·1	365	12,096·50	736·07
<i>Mature.</i>						
Madam Mayflower ..	H. B. Curtis Estate, Inglewood	5 307	350·0	365	11,793·20	763·41
1916.						
<i>Two-year-old.</i>						
Mere	F. S. McRae, Palmers- ton North	1 346	240·5	365	12,164·00	663·64
<i>Three-year-old.</i>						
Belvedere Sungleam	E. B. Eagle, Carterton	3 329	309·9	365	11,044·80	626·46
<i>Four-year-old.</i>						
Lady of Collingwood	F. E. Hellyer, Dunedin	4 86	322·1	365	12,096·50	736·07
<i>Mature.</i>						
Madam Mayflower ..	H. B. Curtis Estate, Inglewood	5 307	350·0	365	11,793·20	763·41

Class-averages.

Certificates have been issued to ninety-four first-record Jerseys, and to thirteen on repeat tests. The scarcity of concentrated food-stuffs and the dry summer experienced in some districts evidently accounts for the fact that most of the classes of Jerseys and Friesians evidence no increase over last year's production of the average cows in the class. The mature Jerseys, however, evidence a greater yield

and this class contains a good proportion of 500 lb. butter-fat cows. Floss V, on her retest, has a credit for 621.40 lb. fat. The class productions average for 1917 and 1916 as under:—

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
1917.				
			lb.	lb.
Junior two-year-old ..	39	345	6,429.10	360.62
Senior two-year-old ..	9	323	5,912.40	318.82
All two-year-old ..	48	340	6,123.90	352.70
Three-year-old ..	19	328	7,176.40	398.21
Four-year-old ..	9	340	7,926.60	410.53
Mature class ..	31	347	8,454.99	460.92
1916.				
Two-year-old ..	56	336	6,336.77	356.95
Three-year-old ..	20	348	8,061.87	430.60
Four-year-old ..	11	356	8,325.40	444.67
Mature ..	18	341	8,143.10	443.80

C.O.R. Bulls.

We have the names of twenty-six Jersey bulls on our C.O.R. list. Four of these were placed on this list during the past year, and of the remaining twenty-two there were eight that had their number of C.O.R. daughters increased during the year. These C.O.R. bulls have sired 190 of the 450 C.O.R. Jersey females to date. This proportion may increase as the work extends.

The names of the C.O.R. Jersey bulls, together with the number of their C.O.R. daughters and increases during the year, are as follows:—

Name of Bull.	Total of C.O.R. Daughters.	Number of Daughters qualified during 1917.	Name of Bull.	Total of C.O.R. Daughters.	Number of Daughters qualified during 1917.
K.C.B. ..	21	2	Lord Lepperton ..	5	..
Eminent's Fontaine..	18	2	Pride of Egmont ..	5	..
Majesty's Fox ..	18	5	Silver King (Stuckey's)	5	..
Starbright ..	9	..	Good Luck ..	4	..
Rozel's Sultan ..	9	2	M.H.R. ..	4	..
Roberts ..	9	3	Glory ..	4	..
M.L.C. ..	8	..	Brighton Twylish ..	4	..
Blizzard ..	7	..	Young Emperor III	4	..
Campanile's Sultan ..	7	1	*Molina's General ..	5	3
Stevenson ..	6	..	*Mabel's Dairyman..	6	3
Goddington ..	6	..	*Fancy's Carnation's	4	2
Golden Swan ..	6	..	Fox ..		
Frisky Campanile ..	6	1	*Fancy's Lord Twylish	4	2
Grand Duke ..	6	1			

* Qualified during 1917.

AYRSHIRES.

New Zealand has some good producers among the purebred Ayrshires, but so few of them are being placed on the list of C.O.R. cows that the breed will be unable to maintain that comparative position among our special-purpose dairy breeds which its merit warrants. Since the commencement of C.O.R. testing forty-two Ayrshire cows and heifers have qualified for certificates. For the year under review we have issued only seven certificates on the production of Ayrshires.



ELLESMERE LASS (AYRSHIRE THREE-YEAR-OLD CLASS).

Yield, 10,601.5 lb. milk, 387.69 lb. fat; standard, 288.3 lb. fat.

In the mature class Alexandra of Waipapa produced 14,636 lb. milk containing 582.47 lb. fat. This falls slightly below her previous butter-fat record, although her milk-record has been exceeded. Had war conditions not upset calculations doubtless this cow would have had a credit exceeding 600 lb. fat. As it is, she becomes the new leader of the mature class, replacing Flossie of Koputaroa, who produced 571.48 lb. fat.

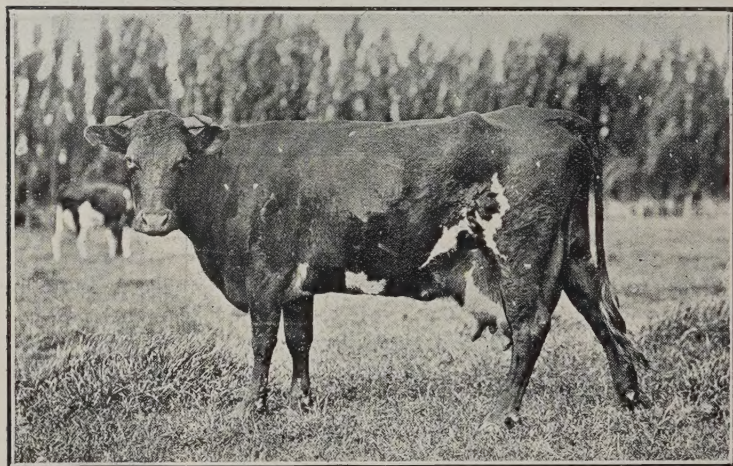
Jessica II of Haydowns, a herd-mate of Alexandra's, has completed a record which adds prestige to the breed. Her C.O.R. is for 14,257 lb. milk containing 523.33 lb. fat. More records of this calibre are necessary in order that the breed may be done justice. In the three-year-old class Ellesmere Lass produced all but 100 lb. of fat over her requirement.

Following are the Ayrshire class-leaders for 1917:—

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat
1917.						
<i>Two-year-old.</i> Kanadale Linda ..	Cockburn Bros., Mataura	Yrs. dys. 2 348	lb. 275.3	365	lb. 12,583.00	lb. 502.55
<i>Three-year-old.</i> Adelaide II of Waipapa	F. Mills, Waipapa, Hawera	3 321	309.1	365	11,604.20	426.68
<i>Four-year-old.</i> Alexandra of Waipapa	F. Mills, Waipapa, Hawera	4 348	348.3	365	14,348.60	591.16
<i>Mature.</i> Alexandra of Waipapa	F. Mills, Waipapa, Hawera	6 354	350.0	365	14,636.00	582.47

MILKING SHORTHORNS.

The largest number of certificates issued in one year on the records of Milking Shorthorns was registered during the period under



DOMINION DAPHNE V.

Leader of the Milking Shorthorn three-year-olds. (See list.)

review. In all twenty-one certificates were issued, all of which went to North Island breeders. The Ruakura Farm of Instruction received

five certificates. Two of these were for the productions of Cora and Spot, the former with 132.45 lb. and the latter with 102.94 lb. fat above their respective requirements. Princess of Dungiven, owned by Mr. W. Brady, Woodville, produced the fine credit of 518.03 lb. fat. In addition to the latter record, seven others were for credits of over 400 lb. fat.

Since the beginning of the testing five two-year-old Shorthorns have averaged 310.99 lb. butter-fat, three three-year-olds 373.2 lb., and two four-year-olds 407.68 lb.; and the average yield for the twenty in the mature class is 414.5 lb. fat.

To the end of December last we had issued thirty certificates on records of the Shorthorn breed. As this number grows breeders should have more choice in selecting those strains they desire to continue. At present one of the greatest difficulties confronting the breeder is the selection of the herd sire which will transmit the desired qualities to his offspring.

The following is the list of Milking Shorthorn class-leaders for 1917:—

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
<i>Two-year-old.</i> Joyce II of Hillview	W. Wright, Matapu, Hawera	Yrs.dys. 2 215	lb. 263.0	365	9,860.00	365.34
<i>Three-year-old.</i> Dominion Daphne V		3 303	307.3	354	11,033.60	427.90
<i>Four-year-old.</i> Cora	Ruakura Farm of Instruction, Hamilton East	4 233	336.8	365	10,931.50	469.25
<i>Mature.</i> Beauty		*	350.0	365	13,477.20	551.24

* Mature.

APPRECIATION.

The pleasure of the work connected with the C.O.R. testing has been much increased by the hearty co-operation of the secretaries of the several breeders' associations. Correspondence has always been promptly and efficiently attended to by them. The breeders, too, almost without exception, have endeavoured to expedite the work as much as possible. This assists the Division in keeping the records in order and posted up to date.

CLOSING LIST OF RECORDS FOR 1917.

The appended list completes the records made up to the end of December, 1917, following the previous list published in the December *Journal* :—

Name of Cow and Class.	Tested by.	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.

FRIESIANS.						
<i>Junior Two-year-old.</i>						
Monavale Jessica Paxton	C. C. Buckland, Cambridge	2 151	255·6	365	11,215·10	386·79
Manor de Kol Beets..	R. F. Hodge, Te Horo	2 33	243·8	325	9,453·30	351·16
Dominion Violet Fobes	Central Development Farm, Weraroa	1 357	240·5	365	9,770·25	325·88
Dominion Coringa ..	Ditto	2 26	243·1	331	9,230·25	320·14
Sunflower II of Ashlynn	R. F. Hodge, Te Horo	2 96	250·1	307	8,339·30	307·55
Victress of Ashlynn..	" ..	2 79	248·4	350	7,194·70	278·82
<i>Senior Two-year-old.</i>						
Dominion Margosa ..	Central Development Farm, Weraroa	2 332	273·7	325	10,492·75	322·94
Dominion Belle Corona	Ditto	2 247	265·2	311	8,787·00	312·74
Pansy Rozine ..	A. J. Gallichan, Tiakitahuna	2 360	276·5	303	8,116·90	279·18
<i>Junior Three-year-old.</i>						
Bainfield Topsy ..	W. D. Hunt, Invercargill	3 33	280·3	365	13,421·50	543·96
<i>Senior Three-year-old.</i>						
Longbeach Michaelmas Daisy	Clifford Bros., New Plymouth	3 306	307·6	333	10,502·60	419·99
Dominion Queen Gertrude	Central Development Farm, Weraroa	3 300	307·0	309	9,875·00	332·02
<i>Junior Four-year-old.</i>						
Oakwood Clover ..	A. S. Elworthy, Timaru	4 1	313·6	365	18,593·70	582·10
Grace de Kol Burke	F. W. Koberstein, Taonui	4 14	314·9	365	14,027·80	578·66
Pauline of Ashlynn						
<i>Mature.</i>						
Queen Van Cleve ..	A. S. Elworthy, Timaru	6 31	350·0	365	17,529·40	599·56
Dominion Jessie Fobes Beets	Central Development Farm, Weraroa	6 179	350·0	343	15,474·00	545·80
Laurel of Wairuna ..	W. D. Hunt, Invercargill	5 128	350·0	287	14,078·50	504·13
Riverside Lass ..	F. W. Koberstein, Taonui	6 57	350·0	365	14,090·10	485·64
Olga	Central Development Farm, Weraroa	5 269	350·0	325	11,631·25	485·25
Dominion Mutual Mercedes of Rock	Ditto	5 364	350·0	345	12,146·25	435·32
Mierlo	"	8 61	350·0	337	13,667·25	430·05
JERSEYS.						
<i>Junior Two-year-old.</i>						
Miro Meadows Pride	A. W. Ward, Miro ..	2 71	247·6	356	7,674·40	436·20
Woodstock's Fancy..	Mrs. A. Banks and Son, KIWITEA	2 33	243·8	365	7,541·60	416·36
Avalanche's Maid ..	H. Purdie, Brixton ..	1 346	240·5	356	6,832·10	405·61
Paratawhiti Prim ..	H. L. Spence, New Plymouth	1 332	240·5	365	6,661·00	343·41

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.			
				Days.	Milk.	Fat.	
JERSEYS—continued.							
<i>Jun. Two-year-old—ctd.</i>		Yrs.	dys.	lb.	lb.	lb.	
Breezy	W. V. Harkness, Tariki	2	4	240.9	328	5,809.20	289.60
Prim's Maid ..	H. Purdie, Brixton ..	2	1	240.6	251	4,691.20	250.67
<i>Senior Two-year-old.</i>							
Camille	P. Mungavin and Sons, Porirua	2	276	268.1	365	7,669.70	364.47
Gipsy Countess ..	Ditto	2	356	276.1	319	6,345.90	329.03
Rozel's Brighteyes III	W. V. Harkness, Tariki	2	353	275.8	362	6,343.40	300.41
Oakland's Cowslip ..	„ ..	2	352	275.7	314	5,283.30	287.22
<i>Three-year-old.</i>							
Rozel's Zest ..	W. V. Harkness, Tariki	3	335	310.5	365	7,055.70	423.32
Pencarrow's Favourite	F. E. Day, Tamahere	3	40	281.0	320	7,836.50	397.12
Dominion Cherry ..	Ruakura Farm of Instruction, Hamilton	3	48	281.8	365	6,487.30	389.49
<i>Four-year-old.</i>							
Eminent Lass ..	C. G. C. Dermer, Cheltenham	4	364	349.5	365	9,920.30	500.02
Lady Soumise ..	C. Goulter, Blenheim	4	233	336.8	363	7,285.30	391.56
Lady Molina ..	F. E. Hellyer, North-east Harbour, Dunedin	4	6	314.1	314	6,894.00	359.19
<i>Mature.</i>							
Fancy Fox ..	F. E. Day, Tamahere	5	16	350.0	325	7,538.20	352.81
MILKING SHORTHORNS.							
<i>Two-year-old.</i>							
Lady Rachel ..	Central Development Farm, Weraroa	1	351	240.5	317	7,016.40	270.35
<i>Three-year-old.</i>							
Dominion Daphne V	Central Development Farm, Weraroa	3	303	307.3	354	11,033.65	427.90
Pansy II	E. Law, Shannon ..	3	355	312.5	335	7,924.70	330.37
<i>Four-year-old.</i>							
Cora	Ruakura Farm of Instruction, Hamilton	4	233	336.8	365	10,931.50	469.25
<i>Mature.</i>							
Lena	J. R. Anderson, Tiakitahuna	*		350.0	365	9,484.00	494.56
Spot	Ruakura Farm of Instruction, Hamilton	*		350.0	365	11,648.90	452.94
Dinah	Ditto	*		350.0	335	10,993.80	420.63
Eureka	„ ..	*		350.0	352	10,880.80	394.71
Tulip	„ ..	*		350.0	348	12,226.70	393.77
Pet	J. R. Anderson, Tiakitahuna	*		350.0	365	9,912.90	364.73
Smut	Ditto	*		350.0	365	8,670.30	359.83
Blossom I ..	E. Law, Shannon ..	*		350.0	349	9,031.00	356.49
AYRSHIRES.							
<i>Two-year-old.</i>							
Ruby's Favourite of Springfield	A. H. Hansen, Te Runga	1	352	240.5	364	5,809.2	254.56
<i>Three-year-old.</i>							
Ellesmere Lass ..	F. S. Veale, Hastings	3	113	288.3	365	10,601.50	387.69
<i>Mature.</i>							
Alice III of Dunkerron	A. H. Hansen, Te Runga	*		350.0	364	8,446.50	363.74

* Mature.

THE PHOSPHATE PRODUCTION AND RESOURCES OF THE WORLD.*

P. G. MORGAN, M.A., F.G.S., Director of the New Zealand Geological Survey.

INTRODUCTION.

THE Chinese from time immemorial have used burnt bones as a fertilizer, but it was not until well on in the nineteenth century that the value of bones as phosphatic fertilizers was correctly understood in Europe. Previous to that time the manurial value of ground bones was attributed to their gelatinous material. Even as late as 1830 a journal stated that since bones contain only 2 per cent. of gelatine, they may be considered as having no value as manure. The fact that the chief value of bonedust lies in its phosphate-content was not fully accepted until 1843, when the Duke of Richmond made experiments showing that bones from which the gelatine had been removed were equal in fertilizing-power to fresh bones.

The famous chemist Liebig in 1840 recommended the treatment of ground bones with sulphuric acid in order to bring their phosphate into the more soluble form of superphosphate. In the same year Sir Gilbert Lawes, working independently, put the process recommended by Liebig in operation on his farm at Rothamsted. Lawes also made the discovery that mineral phosphates could be similarly utilized, and in 1842 patented a process for making superphosphate of lime from raw phosphate mined from the nodule-beds of the British greensand. At that time hardly anything was known of the world's phosphate resources, and England appeared to have almost a monopoly, so that Liebig optimistically declared that England had in her phosphate deposits a source of wealth equal to her coalfields. Since then, however, important discoveries of rock phosphate have been made in many countries, and the English deposits have sunk into comparative insignificance.

WORLD'S PRODUCTION OF PHOSPHATE.

In 1913 the world's production of phosphate, according to *The Mineral Industry* (Vol. 23, 1914, p. 584), was over 6,780,000 metric

* This summary of the information available concerning the world's supply of phosphates is in part derived from an abstract of a lecture by Professor J. W. Gregory, in the *Mining Magazine* for May, 1917, in part from *The Mineral Industry*, and in part from other sources. Detailed statistics of production, &c., appear in the *International Crop Report and Agricultural Statistics* (Rome), September, 1917, pp. 736-749.

tons (a metric ton is 2,204.6 lb. or 0.984 of an English ton), and according to Professor Gregory 6,888,000 tons. The latter and higher estimate is probably the more correct, but unfortunately it is not quite clear whether it is given in English or metric tons, though presumably the unit used is the metric ton. In addition to the rock phosphate mined in various parts of the world 4,000,000 tons of basic slag are annually produced in Europe (more than half in Germany) and used as a fertilizer. In 1913 Peru produced 74,337 tons of guano, principally from the islands off the coast. There are no available records of the guano produced elsewhere or of the amount of bonedust and burnt bone used for agricultural purposes, nor yet of the amount of phosphatic chalk, greensand, &c., applied to the land as soil-dressings, &c.

According to Gregory, the United States in 1913 produced 3,161,156 tons of phosphate (*The Mineral Industry* gives 3,068,604 metric tons), Tunis and Algeria produced 2,750,000 metric tons, France 335,000 metric tons, Ocean and Nauru Islands, in the Pacific, 300,000 metric tons, Belgium 219,420 metric tons, and Egypt 101,311 metric tons. The statistics given by *The Mineral Industry* in the volume already quoted as a rule do not materially differ from Gregory's, but are much fuller. According to *The Mineral Industry*, in 1912 Christmas Island (Indian Ocean) produced 300,000 tons, but in 1913 only 150,005 tons. Islands in the Pacific Ocean are important producers, a fact of peculiar interest to New Zealand and Australia. In 1912 Ocean Island produced 300,000 tons of phosphate, but in 1913 only 250,000 tons. In 1913 the French island of Makatea produced 82,000 tons, and the German-owned Palau Group (Western Carolines) 90,000 tons. Angaur Island was probably the principal producer of this group. Nauru Island, in the Marshall Group, produced 50,000 tons or more. Rosa Island, one of the Japanese-owned Loochoo Islands, also had a considerable production. In 1913 South Australia produced 5,050 tons of phosphate rock; in 1914, 6,083 tons; in 1915, 4,614 tons; and in 1916, 5,013 tons. In 1913 New Zealand produced 11,000 tons of phosphate rock; in 1914, 10,743 tons; and in 1916, 7,600 tons. No official record of the 1915 production has been found. Russia, Spain, and the Dutch West Indies are among the other producers of phosphate mentioned in the literature consulted. The New Zealand and Australian outputs are ignored both by Gregory and *The Mineral Industry*, but the omission need not be considered remarkable, in view of the difficulty of obtaining data relating to the world's production either of raw or unmanufactured materials.

Since the outbreak of war the production of phosphate has much decreased, at first owing to the market disorganization caused

by the war, and afterwards owing to the scarcity of labour and of shipping. The labour difficulty is particularly acute in Tunis and Algeria, where most of the operators have joined the French army. The production during war years has therefore been less than two-thirds that of the preceding years.

WORLD'S PHOSPHATE RESOURCES.

*Guano.**—According to Professor Gregory, as summarized in the *Mining Magazine*, guano is practically limited to small tropical islands with a dry climate off the western coasts of South America, South Africa, and Australia. The main supply is on the guano islands of South America, which extend for about a thousand miles along the coast of Peru and northern Chile. Since 1842 the Peruvian islands have furnished many millions of tons of guano, and with proper precautions for the safety of the birds that are the source of the guano may be expected to supply a considerable annual tonnage of valuable manure almost indefinitely.

Several small islands off the New Zealand coast contain small deposits of guano. One or two of these have been worked—for example, that on Green Island, near Dunedin.

Rock Phosphate.—The world's greatest reserves of rock phosphate are in the United States. The State of Florida produces a great tonnage of very high-grade phosphate, and no doubt has considerable reserves, but these are not likely to last more than a generation. Tennessee and South Carolina are also large producers, and the former State in particular has large reserves of phosphate rock. Much the greatest supply of phosphate, however, occurs in the Carboniferous shales and limestones of the Rocky Mountain states, Utah, Idaho, Wyoming, and Montana. As yet the deposits have been worked only to a very small extent. Professor Gregory states that the field is estimated to contain 2,500,000,000 long tons of rock, with 70 per cent. of tricalcic phosphate and 10,000,000,000 tons of lower-grade material. The United States Geological Survey officially estimates the quantity of high-grade phosphate as 3,000,000,000 long tons, but adds that the estimate, being based on outcrop data only, may be excessive.† The State of Arkansas has considerable but low-grade deposits of phosphate. In Kentucky there are a few small high-grade deposits.

* The term "guano" is frequently incorrectly applied to the phosphate rock imported into New Zealand from the Pacific islands. It should be applied only to the unaltered or slightly altered droppings of birds. This material is highly nitrogenous, and therefore is a more powerful manure than phosphate rock, superphosphate, or bonedust.

† Smith, G. O., and others: "The Classification of the Public Lands." U.S. G.S. Bulletin No. 537, 1913, p. 126.

The well-known apatite deposits of eastern Canada are not able to compete with the richer and more easily worked rock phosphates of the United States, and consequently are not now being mined to any extent. A rich phosphate deposit is said to have been discovered about 1914 in the valley of the Huasco River, 300 miles north of Valparaiso, Chile. No other South American deposit is mentioned in the literature consulted for the purpose of this abstract.

Next in importance to those of the United States are the phosphate deposits of Tunis and Algeria. In these countries beds of phosphate occur in Eocene rocks, and are in places as much as 10 ft. thick. At Gafsa, in southern Tunis, where there is the world's greatest phosphate-mine, four important beds occur. Egypt also has valuable phosphate deposits in Cretaceous limestone near Kosseir, on the western side of the Red Sea; farther north near Safaja (Safaga) Bay, where the Egyptian Phosphate Company is operating; and at Sebaia (Sibaia), on the Nile, almost due west of Kosseir. According to the Egyptian Mines Department, the phosphate-beds of Egypt cover an enormous area in the aggregate.*

In Europe, Russia, though not the principal producer, seems to contain the most important phosphate reserves. The phosphate of Podolia, along the Galician frontier and in Bessarabia, ranges over 1,500 square miles, and is estimated to amount to 80,000,000 tons. Bessarabia also has another deposit, perhaps of equal importance. In central Russia are Cretaceous glauconitic sands containing 13 to 20 per cent. of phosphate. These may locally give rise to richer deposits. Farther north are low-grade deposits with about 36 per cent. of phosphate. The Cretaceous rocks of the Somme and Arras districts in France contain interesting and important phosphate deposits. Towards the Pyrenees, also, are extensive but low-grade deposits. The phosphate-beds of Belgium are almost as important as those of France. It is almost unnecessary to state that phosphate-mining in these countries has been entirely disorganized by the war, but probably the industry has been restarted in Belgium for the benefit of the German invaders. Spain produces only a little phosphate, and production of phosphate in Germany and England (apart from basic slag) has almost entirely ceased. In 1876 the English output was 250,000 tons, three years later only 30,000 tons, and in 1894 was no more than 700 tons.

No workable deposits of phosphate rock are mentioned in the literature consulted as occurring in the Continent of Asia, but, as already mentioned, there is a Japanese production from Rosa Island,

* "Notes on the Mineral Resources of Egypt," Department of Mines, Cairo, 1914, pp. 5, 6.

in the Loochoo Islands. Some phosphate has also been mined in the Province of Eclugo. A deposit of phosphate, estimated to contain 960,000 tons, is reported from the Pratas Islands (Chinese), 170 miles south of Hong Kong. The more important phosphate-bearing islands in the Pacific Ocean have already been noted. Besides these, quite a number of other islands in the Pacific are known to carry phosphate, and without doubt numerous deposits yet remain to be discovered. No reliable estimate of the reserves even on the worked islands can be given.

New Zealand has its Clarendon (Otago) deposits, which, unfortunately, are not extensive. There is a possibility of the phosphatic horizon that marks the base of the Tertiary rocks in several parts of Marlborough and North Canterbury proving workable in places, but no high hopes can be held out from this quarter.

Phosphatic Limestone, Greensand, &c.—In some countries considerable but unknown amounts of low-grade phosphatic limestone or greensand occur. The phosphatic greensand of central Russia has already been mentioned. In France and perhaps in Belgium large deposits of phosphatic chalk occur. Limestone carrying from 5 to 10 per cent. of phosphate has been reported from several localities in New Zealand. Similar material no doubt occurs in many other countries from which no information is available.

Basic Slag.—The slag produced during the manufacture of steel from iron made from phosphatic ore is of great value for agricultural purposes. The production of such slag in Germany and England cannot have materially lessened during the war, and after the war may be expected to show a considerable increase. In 1913 the principal producers of basic slag were: Germany, 2,250,000 tons; France, 730,000 tons; Belgium, 655,000 tons; Great Britain and Ireland, 404,000 tons; and Luxembourg, 250,000 tons. The smaller producers were Austria-Hungary, Russia, Sweden, and Italy.*

The iron-ores of Alsace-Lorraine and adjoining territories contain an enormous reserve of phosphorus, which in the course of the manufacture of steel by the Gilchrist-Thomas or basic-hearth process passes into the slag. The phosphatic iron-ore resources of England are perhaps almost as great as those of the Alsace-Lorraine region, but have not been developed to the same extent, largely on account of the presence of the phosphorus, which, harmful as an ingredient of steel, is so valuable as a soil-constituent. There is more than a suspicion that delay in the development of English phosphatic iron-ores has been caused by the narrow-mindedness and ignorance of persons who

* *International Crop Report and Agricultural Statistics*, September, 1917, p. 744.

ought to have known better, coupled with the influence exerted by those pecuniarily interested in the purer "Bessemer" ores, which can be made into steel by the acid-hearth process. Hence the small production of basic slag in England as compared with Germany, or even little Belgium.

SOURCES OF PHOSPHATE DEPOSITS.

The effect of modern agriculture is to remove phosphorus from the soil and convey it to the habitations of men in the form of milk, meat, wheat, oats, &c. By far the greater part of the phosphorus fails to return to the soil. Instead, it mainly goes to the sea with the sewage of towns and cities. Some of it is speedily recovered in the form of guano, and ultimately, in the course of geological ages, a great deal may return to the land in one way or another. The sea, indeed, is in a sense the source of practically all our phosphate deposits except the apatite veins of Canada and Norway, but not the ultimate source. This is the apatite of igneous rocks, which on the average contain 0.6 per cent., or 6 parts in 1,000, of that mineral, equivalent to $2\frac{1}{2}$ parts of phosphorus pentoxide (phosphoric acid) per 1,000 parts of igneous rock. The ordinary processes of denudation remove the phosphoric acid to the sea, in the water of which it is present to the extent of only 0.005 per cent., or 1 part in 20,000. It is removed from the water by various minute animals and plants, most of which supply food to higher forms of life, such as shell-fish, and these to still higher forms, such as crustaceans, fishes, and other animals of the sea. All shells contain a trace of phosphoric acid, some a considerable percentage, and the hard parts of crustacea are always noticeably phosphatic. The accumulation of phosphatic material derived from the remains of sea-animals goes on more or less constantly on the sea-bottom. Lime is removed in solution by carbon dioxide, and ultimately in places rich and thick deposits of phosphate may form. These may become covered by layers of other material, and long after the beds may be elevated and form dry land, where in the end they are mined.

In their modes of origin guano and certain irregular deposits of rock phosphate diverge from the process just outlined. Sea-birds devour fish in enormous quantities. On the islands to which they resort guano is formed by the accumulation of their excrement. If the surface of the island consists of coral or other form of limestone, this may be converted into phosphate of lime by interaction with the phosphoric acid of the guano. If the rock is volcanic, phosphate of alumina is likely to be formed, as at Clipperton Atoll. Such a reaction has taken place to a small extent at Green Island, near

Dunedin, and to a still smaller extent at the Sugarloaves, New Plymouth, where an aluminium phosphate, called "taranakite" by Skey, occurs in association with wavellite, the ordinary hydrous aluminium phosphate.

CONCLUSION.

Though in one way and another mineral phosphates are being regenerated, yet the processes on the whole are extremely slow, and occupy not years but geological ages. Most of the phosphate accumulating on the deep ocean-floors will never see the light of day. At the present time the world is mining the deposits that have been formed during the many millions of years that have elapsed since it first became inhabited by plants and animals. After all possible allowance for new discoveries is made, the fact remains that our mineral phosphates will be exhausted in a small fraction of a geological age, and in a period that is not so very long as measured in years. The known phosphate resources of the world are not large in comparison with its needs. It behoves us in New Zealand to obtain control of some of the rich phosphate islands of the Pacific and, in common with the rest of the world, to conserve and make the best possible use of what resources we have. More especially, every effort to prevent the waste of phosphatic material that goes on in all parts of the civilized world ought to be made.

BUDDLEIAS: GOOD HEDGE AND BEE PLANTS.

THE *Buddleia* family of plants is best known in New Zealand by the species *globosa*. This species is largely grown, and hedges of it are fairly common. It is distinguished from all other plants by its curious inflorescence as clusters of orange-coloured balls. The species *variabilis* and *veitchianus* are more desirable plants. The flowers of both these species are borne on long trusses. Those of *B. veitchianus* are 12 in. long, colour purple. The flowers of *B. variabilis* are on similar trusses but not quite so long and less massive, colour lilac with yellow eye. These plants are the subject of frequent notice in English horticultural papers, owing to the large number of butterflies that visit the flowers. In this country, at any rate, they also attract bees. The treatment that is necessary to secure good flowers lends itself admirably to the requirements of a hedge. Plants should be spaced 2 ft. apart, and well cut back when planted. Further treatment consists in a heavy cutting-back during winter. Although the outline of the hedge will be somewhat ragged during the summer months, the flowers make it a thing of beauty. Flowers are produced over a long period. When the flowers are past the hedge may be lightly trimmed, but a heavier cutting must be made in winter.—W. H. Taylor, *Horticulturist*.

NOTES REGARDING TICKS FOUND ON FARM ANIMALS IN NEW ZEALAND.

C. J. REAKES, D.V.Sc., M.R.C.V.S., Director, Live-stock Division.

OFFICERS of the Live-stock Division have lately made a special investigation into the apparently unusual prevalence of ticks upon cattle, dogs, horses, and occasionally sheep, in portions of the northern Auckland district. For this purpose Mr. W. T. Collins, M.R.C.V.S., Government Veterinarian, spent some time in the district, and went fully into the whole of the questions involved, particular attention being directed to the point whether any diseased condition of cattle was associated with the presence of these ticks. Prior to joining the New Zealand Government service Mr. Collins had been engaged in special post-graduate work at the laboratory of the Royal Veterinary College, London, and the experience there gained in the scientific side of veterinary work has rendered his services of particular value to the Department.

A considerable amount of concern and uncalled-for alarm has been felt by settlers and others on account of the presence of these ticks, it being feared that the Dominion was faced with the necessity for combating the serious disease of cattle known as tick-fever, which exists in Queensland, the United States, and some other countries. It should be made clear that the presence of ticks on cattle in New Zealand does not imply the existence of this disease, which is not, and never has been, present in the Dominion.

The degree of significance to be attached to the presence of ticks in the presence or absence respectively of tick-fever is made clear in the following extract from a bulletin published in 1917 by the Commonwealth Advisory Council of Science and Industry (Australia) :—

The cattle-tick is the natural intermediary in the dissemination of tick-fever, and it is probable that a single infected tick is capable of reproducing the disease in a susceptible beast. The transmission of the disease usually occurs soon after the larval tick attaches itself to the skin of the host, the infection being transmitted to the larval tick from the infected adult female parent through the egg. Non-infected ticks become infected when they feed upon an animal that harbours the piroplasma in its blood-stream. Consequently those ticks which develop upon cattle that have not suffered tick-fever, or upon other animals naturally insusceptible to the fever, are incapable of spreading infection. This fact accounts for the absence of tick-fever in certain centres where the tick has been introduced by horses or sheep.

The "cattle-tick" mentioned in this extract is of the variety known as *Boophilus australis*. In North America the same disease is spread through the agency of a tick termed *Boophilus annulatus* or *Rhipicephalus annulatus*, which differs only in slight structural features from the Queensland tick, the life-history of the two being practically identical. These ticks have never been discovered here.

Two varieties of ticks have been found in New Zealand, one being named *Ixodes ricinus* (popularly termed the "dog-tick" or the "castor-bean tick"), the other being a tick of the subfamily known as *Hoemaphysalis*. Both represent branches of one family termed *Ixodinae*, of which the Queensland and North American varieties of tick are also branches. All are blood-sucking parasites, and probably all are capable of acting as carriers of tick-fever when that disease exists among cattle, but none of them can set up the disease independently.

In Great Britain and other European countries *Ixodes ricinus* acts as a carrier of the infection of a form of red-water affecting cattle. This disease does not cause any serious loss to British farmers, and has never been found in New Zealand. We occasionally get cases here of what is termed red-water, but this trouble is due to dietetic causes, and when taken in time is readily curable by a change to a more nutritious diet containing plenty of albuminoids, combined with simple medicinal treatment.

Tick-fever, technically known as "piroplasmosis," is a specific disease of cattle caused by a protozoan parasite termed *Piroplasma bigeminum*, which is found present in the blood of affected animals; and ticks, being blood-sucking parasites, act as carriers of infection from animal to animal. So long as we can continue to keep this disease out of the Dominion there is nothing to fear from that point of view from the ticks we have here. But these can do harm in other directions if they become very numerous, and on this account it is considered necessary to take steps to control their dissemination, and to go as far as is possible towards eradicating them.

The closest inquiry has failed to indicate any form of sickness or any serious trouble caused by ticks in New Zealand, but the experience of other countries goes to show that they may, if present in very large numbers, cause trouble to stockowners in the future, even though the serious disease, tick-fever, is absent. The directions in which, under the worst conditions, trouble may be caused may be summarized as follows:—

- (a.) By the lowering of condition through loss of blood when large numbers of ticks are harboured by one animal.
- (b.) By decreased milk-yield of cows harbouring large numbers of ticks.

(c.) By deterioration in the value of hides. When large numbers of ticks are present the value of the hide for conversion into leather is reduced. It is stated that a badly affected "ticky" hide is worth from 4s. to 10s. less than if sound.

(d.) Possible mortality among animals harbouring large numbers of ticks when they are already weakened by various forms of sickness, insufficient food, &c.

Ticks of the *Ixodinae* family are found over all Europe, in North and South Africa, Asia, Australia, and America, and they thrive well in temperate climates, though they appear to multiply most extensively in countries possessing a hot climate. In New Zealand they have been noted almost exclusively in the country lying north of the City of Auckland, the only other specimens obtained having been found in the northern part of the Bay of Plenty district, where their presence has been notified on two occasions only. Inquiry shows the probability of their having been found in the extreme north of of Mongonui County some twenty-five years ago, and authentic information has been obtained of their presence in one part of Whangarei County eleven years since.

TREATMENT.

The Divisional officers have carried out a good deal of experimental work in the direction of ascertaining the best form of treatment for destroying the parasites, and it has been found that, in the case of dairy cows and other cattle which can be handled or sufficiently controlled, spraying with Stockholm tar is an effective method, as the ticks are killed by it in a few hours. The tar is sprayed on to the infested portions of the skin by means of a small spray-pump known as the "Faultless" pump, costing only a few shillings, which was placed on the market for use in spraying garden-plants, &c.

Other spraying preparations tried were as follows:—

(a.) Kerosene $\frac{1}{2}$ pint, linseed-oil $\frac{1}{2}$ pint, sulphur 1 oz.

(b.) Kerosene 10 oz., lard 10 oz., tar 2 oz., sulphur 1 oz.

These two mixtures, however, though ultimately destroying the ticks, proved much slower in their action than the Stockholm tar. Very strong solutions of sheep-dips have also proved effective, but, owing to the strength of the solutions sometimes used, cases have occurred where cattle have suffered from the effects of them. The method of spraying with Stockholm tar can be recommended as the safest and most reliable, and it has been largely used by settlers. All dead ticks must be collected, if possible, and destroyed, preferably by burning.

As regards run cattle, unaccustomed to handling, dipping is the only effective method available.

It has been found that in New Zealand the ticks are first noted in each year about August and September, and are most numerous in November and December. During January their numbers diminish, and between February and August little or nothing is seen of them.

LIFE-HISTORY OF THE TICKS.

The following short description of the life-history of these ticks will be of interest :—

The adult tick, usually the engorged female, is the form most commonly met with, but before maturity is reached there are three distinct stages of development : (1) Egg ; (2) larva ; (3) nymph.

1. The eggs are deposited on the ground, usually in some sheltered position, by the engorged female tick ; they are light brown in colour, glistening, and vary in number from four thousand to fifteen thousand. These hatch out in a variable time, depending on temperature and climatic conditions, and give rise to the seed-tick or hexapod larva.

2. The hexapod larva or seed-tick is brown in colour, about the size of a pin's head. It possesses three pairs of legs, is very active, and runs up blades of grass, shrubs, and brushwood, hanging from these until an opportunity arises for it to become attached to some animal. In some ticks the whole of the subsequent stages of development are passed on the same animal, as in the case of the Texas fever-tick, the tick holding on by its mouth-parts ; in other cases the various changes take place on the ground. The seed-tick having undergone structural changes and shed its skin—"moulting," as it is called—changes into the nymph.

3. The nymph is distinguished from the seed-tick by the presence of another pair of legs, and from the adult tick by not being sexually mature. The nymph becomes engorged with blood, and, falling to the ground (or, as above mentioned, staying on the same animal as in larval stage) moults, and becomes the adult or sexual tick. The male tick is not so commonly met with as the female, and is usually flat or only slightly distended. The mating of the male and female ticks takes place either on the animal on which they are feeding or on the ground, the female tick then depositing the eggs as above described, and thus completing the life cycle.

CONCLUSION.

The question of the best and most effective further measures to be adopted in dealing with ticks will be treated in a future issue of the *Journal*. Meanwhile it is trusted that the foregoing facts will enable stockowners to realize that, though the ticks found here may prove troublesome from the standpoint of monetary loss if they multiply sufficiently, they are not dangerous from the point of view of disease so long as we can, by maintaining our present quarantine system, keep the specific disease out of the country ; also that there is no risk of any kind involved by the movement of cattle from infested districts to others so long as care is taken to prevent them carrying ticks with them.

PASPALUM IN NEW ZEALAND.

A. H. COCKAYNE, Biologist.

THE outstanding feature of paspalum* in New Zealand is the very large amount of herbage produced between December and April. No other permanent-pastured grass can compare in summer yield with paspalum. The herbage produced is very nutritious and relished by all classes of stock. Owing to the very long period during which flowering takes place—from early December to the end of March—a continuous supply of fresh growth is maintained. Even when the grass is allowed to get away, the new leafy culms that are constantly being produced allow the rankest of plants to provide admirable cattle-feed. Of course, so far as sheep are concerned, paspalum is quite unsuitable unless kept well cropped down.

From the end of April to the beginning of December the yield of paspalum is small, and except in the warmest parts the growth during the winter months is practically nil. This very bad feature of paspalum is coupled with the fact that it is likely to crowd out finally all other grasses and produce a pure paspalum pasture. Again, when occupying large areas sufficient stock cannot generally be employed to prevent it seeding. The seed germinates and can establish itself even in a thick sward, owing to the shade-enduring character of the young plants. In this way large areas of mixed grass-land may become invaded and turned into pure paspalum pasture. The winter carrying-capacity of pure paspalum pasture, being low, its habit of completely crowding out other grasses is a serious matter. In fact, it is a very moot point whether paspalum should be sown in general-pasture mixtures at all.

The very extensive root-system makes paspalum an admirable drought-resister, and in dry weather when all other herbage is burnt up paspalum will grow vigorously and remain green. The strong, long roots and compact, thick, short rootstocks, forming as they do a complete mat, make the ploughing of paspalum and its eradication a matter of considerable difficulty, but in the past too much emphasis has been laid on this feature.

PERIOD OF SOWING.

For many years it has been customary to consider that paspalum should be sown only in the spring or early summer, and that autumn

* The term "paspalum" in this article refers to the species *Paspalum dilatatum*.

sowing was generally a failure, there not being sufficient heat to germinate the seed. Recent investigations have shown that this supposition is largely erroneous. Autumn-sown seed certainly does not germinate immediately after being sown, but remains dormant in the ground till the following spring and summer, when germination occurs freely even when the ground is well covered with grasses and other plants. As already indicated, paspalum in its seedling stage is what is termed a shade-endurer, and can establish itself even when completely shaded by other grasses. This feature is a very important one, and can be taken advantage of in the establishment of paspalum for special purposes.

Thus in sowing paspalum it is really immaterial whether autumn or early summer seeding is adopted. The only advantage of early summer sowing is that the grass is established more quickly, as immediate germination takes place. However, paspalum is practically never sown pure, and the majority of the other grasses used with it are for preference sown in the autumn. In general, the laying-down of pastures containing paspalum should take place at the most suitable period for the successful establishment of the main ingredients of the mixture. On very wet land, where much of the seed would rot in the soil during the winter, mixtures containing paspalum should be summer-sown.

THE GENERAL USE OF PASPALUM.

Paspalum may be said to be generally sown in most permanent mixtures on second- and third-class country in the greater part of the Auckland and the northern part of the Hawke's Bay Provinces. In the past paspalum has been included in mixtures for really high-class dairying-land in the Auckland District, but this practice is fast disappearing, and it is mainly on comparatively poor land on which ordinary grasses burn up badly in the summer that paspalum is now used. In general, from $\frac{1}{2}$ lb. to 2 lb. of seed per acre is included in the mixture.

Much has been said both for and against the inclusion of paspalum in general-pasture mixtures, but certainly its use is on the increase in the North. Paspalum and danthonia, mixed perhaps with a certain amount of red-top, have been very successfully used in grassing blackberry-infested country on the Coromandel Peninsula. Paspalum and danthonia carry fires well, and when once established frequent burning will get rid of a great deal of undesirable vegetation and at the same time do no injury to the grass.

For my part, I should be inclined to limit the use of paspalum very considerably as a general-pasture grass, and confine its employment in general pastures to land which under ordinary grasses is of

poor winter carrying-capacity. On such land it will vastly increase the summer carrying. On land that in ordinary grasses yields well during the winter paspalum should be studiously avoided. Many opponents of paspalum consider that its sowing will finally cause great damage by completely destroying all other grasses, and that it will be virtually impossible to eradicate it from any area. However, if this be true the damage has already been done, as there are many hundreds of thousands of acres where this grass has been sown and is established.

SPECIAL UTILITY OF PASPALUM.

Whether or not paspalum should be sown in general-pasture mixtures is a matter for careful investigation, but the value of paspalum as a special permanent summer forage crop, and grown on special areas specifically for this purpose, admits of no argument. In many of our dairying districts a serious falling-off in milk-production regularly occurs after Christmas where there is not an abundance of specially grown summer forage crops. Again, if extremely dry conditions occur shortly after the sowing of any special forages their yield is seriously curtailed, and frequently where apparently ample provision was made the supply of forage turns out to be inadequate.

Paspalum as a permanent special summer forage crop on dairy farms is probably the most reliable crop that can be grown. It has the great advantage of being a pastured crop, and the cost of handling an ordinary forage crop is thus avoided. It is also permanent, so that the cost of establishment can be spread over a number of years, whereas with annual forage crops the whole costs of production have to be recovered in a single season. The yield of paspalum, of course, is comparatively low compared with food crops of maize and soft turnips, but in a long dry season it compares more than favourably with such forages as the millets. Again, on land suitable for the growing of lucerne the establishment of special summer paddocks of paspalum would not be entertained, as lucerne stands head and shoulders above any annual forage crops on land suited to its growth. Lucerne, however, can only be successfully grown on certain special classes of land, whereas paspalum can be established over wide areas where lucerne-growing would be a failure, or, at any rate, the expense of maintaining a stand would be greater than the results warrant.

At the present time the special paspalum-paddock for summer forage is becoming increasingly popular in North Auckland and the northern parts of Hawke's Bay, and even in parts of Taranaki unsuitable for lucerne such paddocks are now becoming a feature of the dairy farm. Just what is not known is how far south paspalum can be adopted as a summer supplementary pasture. There seems, how-

ever, little doubt that its range can be extended to the whole of the North Island and probably to some of the drier portions of the South Island. Its range of distribution will be regulated by the amount of frost experienced. Paspalum is not easily winter-killed even by severe frosts, but under such conditions it does not develop sufficient summer growth to render it suitable for a special summer crop.

ESTABLISHMENT OF SPECIAL PASPALUM-PADDOCKS.

Paspalum is slow to establish, and when sown pure takes several years before it begins to give large summer yields. For this reason special paspalum-paddocks should not be laid down with paspalum alone, but the seed should be sown with an ordinary type of temporary-pasture mixture. Such a procedure will result in the production of a profitable type of pasture until such time as the paspalum has become thoroughly established.

The following standard mixture is suggested: Italian rye-grass, 20 lb.; cow-grass, 6 lb.; cocksfoot, 4 lb.; paspalum, 6 lb. to 10 lb.—depending on the quality of the seed. The cocksfoot is included to help to fill up the ground after the rye-grass has disappeared and before the paspalum has formed a continuous sole.

This mixture may be sown either in the autumn or spring, but as a general rule in the North Island autumn sowing is advocated. In the South Island spring sowing is suggested, as investigations as to whether autumn-sown paspalum germinates freely there after passing through a dormant period have not been made. The temporary pasture can be used for both grazing and hay-production, and should of itself easily pay for the full establishment of the paspalum. A mixture containing paspalum is very difficult to machine-sow, and hand broadcasting is necessary. A good soil cover is also very necessary, but generally harrowing-in the seed will be found quite satisfactory.

In laying down a special paspalum-paddock it would be well to have a wide headland sown with an ordinary permanent-pasture mixture without paspalum, and the temporary mixture plus paspalum should be sown inside this. In seasons when feed is superabundant and there is really no need for any special supplementary feed the paspalum-paddock is likely to get away. If such occurs the mower should be run over the field from time to time to avoid ripening of the seed. Paddocks with a permanent-pasture headland could thus be very easily dealt with, far more so than if the paspalum was sown right on to the fence-lines. In general, the paddock should be kept heavily stocked from December to April, and at no time should the paspalum be allowed to get away. Even when there is abundance of feed on the ordinary pasture

it will pay to heavily graze the paspalum, as it is one of the best of milk-producing grasses.

When a paspalum-paddock has been down a good many years it is likely to become sod-bound, and the yield suffers in consequence. When this condition arises some method of cultivation for loosening the sod should be undertaken. Up to the present very little attention has been paid to the renovation of paspalum-paddocks, and it is a matter that demands investigation.

So far as area is concerned, I consider that 1 acre of paspalum to every six dairy cows should be ample. With this provision the growing of special annual forage crops can be considerably reduced, so that a considerable portion of the expenses otherwise incurred in growing and handling special annual summer feed can be credited to the area under paspalum.

QUALITY OF THE SEED.

Paspalum-seed sold in New Zealand may be either of Australian or New Zealand origin. There appears to be very little difference in the average quality of the seed produced in either country. The very extended flowering and ripening season of paspalum makes it impossible, except in the case of carefully hand-gathered seed, to avoid the line containing a very large percentage of immature seeds incapable of germination. Hence the average germination of paspalum is low. Twenty-six different lines germinated in the Biological Laboratory during the past two seasons gave an average germination of 27 per cent., the highest being 46 per cent. and the lowest 3 per cent. The great range in variation makes it essential that paspalum should always be tested before sowing, as otherwise it is impossible to estimate the amount that should be sown. The number of seeds of paspalum to the pound varies from 500,000 to 600,000, and a germination of 27 per cent. will give from 130,000 to 160,000 living seeds per pound. This represents in living seeds less than half the number contained in a pound of cocksfoot of good average quality. In the line germinating 3 per cent. there were approximately 17,000 living seeds per pound, and in that germinating 46 per cent. 240,000 per pound, so that it took 15 lb. of the low-germinating line to equal in number of viable seeds those contained in a single pound of the one of high germination. This example clearly shows the necessity for the careful testing of paspalum, especially when it is considered that the price of all lines is generally high. In the particular case quoted it took just on 19s. worth of the low-germinating line to equal 1s. 6d. worth of the high one.

CIDER - MAKING.

S. F. ANDERSON, Vine and Wine Instructor, Horticulture Division.

APPLES grown in Britain and in the northern parts of the Continent of Europe are in general of a firmer texture, have better keeping-qualities, and stand handling better than those grown in New Zealand. Comparing the composition of the apples of the colder climates with those of New Zealand, there is, on the other hand, good reason for calculating on a greater amount of juice to the extractive matter in our fruit. In England not more than 13 cwt. to 15 cwt. (about 140 to 160 gallons) of juice can be pressed out of a ton of apples. It does not follow, however, that the specific gravity of the juice is lower in those varieties most suitable for cider-making grown in New Zealand than in English-grown apples. Where the cost of making cider in New Zealand compares unfavourably with the cost in England is that with us the apples decay quicker. This entails more care in handling and shorter periods and different methods of storage.

It has been frequently remarked, Why cannot cider be made from the waste or by-product of the apple-orchard? In fruitgrowing, however, one associates waste products with what is inferior—mothy, bruised, partially decayed, and odd lots unsuitable for market—and it is well to point out at once that a good cider cannot be made from such. Good cider can only be made from clean (not washed) sound apples, and the quality of it then will vary with the variety of apples used, some possessing just that peculiar aroma for the purpose. It does not follow either that the juice of the apple showing the highest specific gravity is best, although this is a very desirable quality.

CIDER FROM MIXED APPLES.

This article has been prepared mainly with a view of assisting beginners who wish to make cider from a mixed lot of apples that vary as to their saccharine-content. In good ripe Northern Spy, Rome Beauty, Newtown Pippin, or Adams Pearmain, all commonly grown in our orchards, the specific gravity of the juice will run as high as 0.1070. Others, such as Sturmer, Five-crown, and Rymer, will run below this. The acidity, provided the apples are ripe, is not likely to be too high. The time of the ripening of apples does not differ too widely for getting a considerable quantity together for the purpose of cider-making. Good cider cannot be made from unripe apples; it would be too high in acid.

There would be no objection to use for cider-making the apples rejected from the first-class market sizes. The main condition is they should be sound and ripe. All apples for this purpose require keeping for a time to mellow. In France great stress is laid upon grinding at the best period of ripeness, in order to secure all the juice possible. The cider-maker judges this by pressing with the thumb until the juice exudes, or by breaking the fruit in halves and crushing one portion in his hand with a wringing motion.

PLANT.

The plant required will depend on the quantity of apples the cider-maker has to handle. If he is a beginner it is advisable to work on a moderate quantity first. We will assume he decides to make his first attempt with a ton of apples. This is about seventeen sacks, and would yield from 150 to 170 gallons of juice.

An apple crusher and press are indispensable for the work. These are at present not made in New Zealand, and unless stocked or obtainable second-hand, importation will be necessary.* Improvization might be resorted to temporarily—for instance, by the use of a wine-press. The ordinary cellar requirements should be obtainable locally.

The articles required for dealing with the quantity of apples mentioned (1 ton) are as follows: Crusher; press; tubs; copper boiler (about 18 gallons); filter; saccharometer; glass jar; thermometer; funnels and wooden taps; cloths and hessian bags; pump and hose; three 60-gallon hogsheads; three or four quarter-casks; kegs and jars.

The cider-making shed should have a concrete floor, well drained to clear away the floor-washings. It should be quite away from stables or other objectionable buildings. A cellar should be available for storing, maturing, and bottling the cider.

GATHERING THE APPLES.

Where the apples are to be picked over and the best in size, &c., reserved for market, the others can be put on straw in heaps to mellow, but, if possible, kept off the ground. Contact with the soil or a wet layer of straw next the soil spoils their flavour for cider, imparting an earthy taste to the latter. In our uncertain climate the apples

* Among British manufacturers who are specialists in cider-making machinery and appliances may be mentioned L. Lumley and Co., 121 Minories, London E.C. Up-to-date machinery for apple-crushing and juice-extraction is also made by American firms, a good hydraulic cider-press, &c., being sold by the Hydraulic Press Manufacturing Company, Meruit Gilead, Ohio, U.S.A. Certain Australian manufacturers also supply requisites in plant; crushers and presses, &c., may be obtained from Cliff and Bunting, 29 Flemington Road, North Melbourne.

are best stored in an open shed, and the cider-maker can then make use of them in any weather. A few may necessarily require washing, but it is not wise to wash more than can be helped, as it removes the natural ferment from the outside of the apple.

CRUSHING.

Before starting to crush the apples complete arrangements should be made for dealing with the juice. The crusher should occupy, if possible, a floor or platform above the other part of the shed, so that crushings and juice can run into the press by gravitation. The presses made are provided with a platform or watertight tray. The juice runs off the cage of the press on to this platform and thence into open tubs. As the extract is of a pulpy nature, in order to retain the pulp the press requires to be lined inside with a porous cloth, such as hessian, or a couple of thicknesses of cheesecloth. When the press is filled this cloth is folded over the top before the blocks are adjusted for pressing. A steady continuous pressure is then applied, and this operation should not be hurried. The better the press the higher is the percentage of juice obtained to quantity of apples.

STRAINING THE JUICE.

Apple-juice differs considerably from other fruit-juices in the amount of mucilaginous matter it contains. It therefore requires to be cleared of the latter by straining. The better this is done the less trouble there will be in getting the cider bright in the casks after fermentation, particularly with a fair amount of natural acid in the juice. The first straining should be through cheesecloth or similar material, then finally through a cone-shaped flannel filter for the final filtering. (See illustration on page 35 of last month's *Journal*.) These filters require to be cleared of the thick matter that collects on the inside, and washed and dried for repeated use.

FORTIFYING.

We now come to the stage of fortifying the natural saccharine of the juice by the addition of sugar. It should be clearly understood by the cider-maker that the alcohol is produced from the saccharine and is its preservative. In a climate like ours, if this is deficient the keeping-qualities of the cider cannot be relied upon. It is very important for the cider-maker to know the amount of saccharine in the apples he is about to crush, no matter what class of cider he decides to make. If it is from a mixed lot, one or two apples from each sort should be taken, and the juice crushed out and strained. It is then put into the glass test-jar. The temperature of the juice must be 60° F. (15.5° C.). The saccha-

rometer is then floated in it, and the mark at the level of the juice noted. We will assume that the specific gravity marks 0.1060. After fermentation is completed there will be possibly 7.35 per cent. of alcohol. This is not sufficient alcohol to preserve cider, hence the reason for adding sugar.

VARIETIES OF CIDER.

Four varieties of cider can be made, classified as follows:—

- (1.) A hard dry cider that contains from 7.5 to 10 per cent. of absolute alcohol by weight, and that requires keeping in a cool cellar or in bottle.
- (2.) A sweet cider that will keep under various changes of temperature. This should contain 15.2 per cent. of absolute alcohol by weight.
- (3.) A sparkling cider containing from 10 to 12 per cent. of absolute alcohol by weight.
- (4.) A non-alcoholic cider. This is apple-juice pasteurized immediately after pressing, fining, and bottling.

The special process required for each of these classes of cider, taking them in the foregoing order, is as follows:—

Hard Dry Cider.—We have a juice showing a specific gravity of 0.1060, and according to the Brix sugar-scale this should contain between 14 and 15 per cent. of sugar. Seeing that it may contain a certain quantity of substances other than sugar, the estimate may be stated as 14 per cent. After fermentation there will possibly be 7.2 per cent. of absolute alcohol, which, as already indicated, is not sufficient to preserve the juice. Two ounces of the best cane-sugar to the gallon will raise the alcohol 1 per cent. Therefore to raise it from 7.2 to 10 of absolute alcohol will require approximately 6 oz. of sugar to each gallon. After fermentation this will be a hard dry cider.

Sweet Cider.—Starting with a juice of the same specific gravity as previously—namely, 0.1060—we have to increase the alcohol-content to 15.2 per cent. by the addition of sugar. The amount of sugar required to raise the alcohol from 7.2 to 15.2 per cent. at the rate of 2 oz. for every per cent. raised is 16 oz. to the gallon. After fermentation has completed its work there should remain a few per cent. of sugar unfermented that will keep the article a sweet cider. Note that the more sugar added, the longer the time of fermentation.

Sparkling Cider.—To make a sparkling or effervescent cider the amount of sugar to be added to the gallon should be about the same as for the dry cider previously stated—namely, 6 oz. to the gallon. The cider used for the purpose must be very well cleared by racking two or three times. No bottling should be done till a perfectly bright sample can be used. It is then bottled by using the indiarubber

tube siphon, testing it from time to time for its brightness by drawing off a little into a tumbler. To each bottle as it is filled is added a small quantity of syrup that should contain equal to $\frac{1}{4}$ oz. of the best cane-sugar. The sugar for this syrup should be dissolved in distilled water by applying a little heat, in the proportion of 5 lb. sugar to 2 pints water. A measure holding two teaspoonfuls will add the quantity required for each bottle—namely, $\frac{1}{4}$ oz. The bottles will now require to be securely corked and wired. The addition of the sugar causes a second fermentation which provides the carbonic gas that makes the cider an effervescent drink. The bottles should then be laid on their sides in a dark corner of a cool cellar. In a few weeks they will be found to be effervescent.

Non-alcoholic Cider.—Non-alcoholic cider is the apple-juice taken from the press, strained, and put into a copper boiler and heated up to a temperature of about 167° F. but not exceeding 176° . The thermometer should be immersed in several places. When the proper temperature is reached, rake out the fire and allow the juice to cool and settle the solid substances. The clear liquor should now be filtered through one of the cone-shaped filters already mentioned. In putting the juice into the filter from the boiler the sediment should not be disturbed, as that would clog the filter. The filtered juice may now be bottled, corked, and wired. This done, a final pasteurizing is necessary. For this purpose the bottom of the copper is made level by some battens, and as many of the bottles stood in the copper as it will hold. Then fill up with water to the necks of the bottles and bring up to boiling. After boiling-point is reached withdraw the fire and allow to cool. The bottles should be stacked in a cool dark corner till required for labelling and packing. In all cases they should be stored in a cool place after packing.

It may be that, owing to the want of a further filtering, the non-fermented liquor will not be bright enough for commercial purposes. When the proper filter is available, however, this can be remedied.

It should be clearly understood in preparing any non-alcoholic wine or cordial that the work, from the pressing of the juice to final disposal of it into the bottles, must be expeditiously performed. Any delay, or exceptionally hot weather just at the time, may bring about some fermentation.

IMPORTANT POINTS TO OBSERVE.

Only use good sound fruit that has been mellowed by keeping.

Carefully test for saccharine and add the necessary sugar.

When dissolving the sugar do not heat the juice above the temperature specified.

Keep the temperature of the fermenting-house within the limits given.

Strain and filter carefully.

Use the greatest cleanliness with all utensils and material. Any hessian, cheesecloth, flannel filter, or other cloths used for the press or straining purposes should be well washed, rinsed in clean water several times, and dried before use.

If the casks used are freshly emptied spirit-casks, do not wash them. Any others must be quite sweet and clean.

Do not permit the juice at any stage to come in contact with iron, as the acid acts on it and spoils the cider.

When operations extend over one day all utensils and the floor should be washed. If an earthen floor, dust lime over it.

POISONING RABBITS WITH STRYCHNINE.

MR. W. WILSON, Fields Inspector, Queenstown, reports further successful experience in the poisoning of rabbits with strychnine, using molasses-sweetened oats as bait. The operations in question were carried out on the reserve at Frankton (Central Otago). He states,—

“I commenced this work by laying the oats sweetened with molasses in plough-furrows, which were run from about $1\frac{1}{2}$ to 2 chains apart. On visiting the ground next morning I found that a large proportion of the oats was eaten. I then again laid oats for feeding purposes, and also on the succeeding days. On the last two nights not a grain was left, the rabbits having cleaned up the lot. I then mixed the sweetened oats with strychnine in the proportion of 24 lb. of boiled oats to 1 oz. of strychnine, using altogether 60 lb. of boiled oats and $2\frac{1}{2}$ oz. strychnine. This I laid in quantities of a teaspoonful every 4 yards apart. On the following morning I went over the reserve, and with assistance picked up 920 rabbits. This I consider very satisfactory, as in addition a certain number will have died in the burrows. Mr. J. A. P. McBride also poisoned two small sections adjoining the reserve, and picked up 100 rabbits.”

A parliamentary return, showing the occupations of all ranks of the New Zealand Expeditionary Force embarked for active service up to and including the 28th Reinforcements, gives the following numbers of those directly connected with agriculture and horticulture and related primary industries: Farmers and farm hands, 18,396; gardeners, 440; nurserymen, 24; veterinarians, 20; dairy-factory employees, 712; slaughtermen and freezing-works employees, 189; stock-buyers, 84; drovers, 34; wool-sorters (including wool classers, buyers, and workers), 695; flax-millers, 76.

A NEW CHAMPION MILK-RECORD FOR NEW ZEALAND.

W. M. SINGLETON, Assistant Director, Dairy Division.

THE Friesian cow Woodcrest Johanna Tehee owned by Mr. J. Donald, of Westmere, calved on New Year's Day, thereby completing her certificate-of-record for 21,483.1 lb. of milk, containing 754.96 lb. of butter-fat. This yield places Woodcrest Johanna Tehee as the highest milk-record cow in New Zealand. She also becomes leader of the senior four-year-old class for Friesians. Prior to Tehee finishing her test the leadership of the senior four-year-olds was held by Mr. W. Barton's Salma Johanna Lyons, with a certificate-of-record (completed last year) for 21,439.8 lb. milk, containing 730.19 lb. fat. Salma's record also placed her as our highest milk-record cow—a position which she has maintained until Tehee finished her production now under notice, which exceeds that of Salma by 43.3 lb. milk.

Woodcrest Johanna Tehee had previously been on test as a senior two-year-old, when in 365 days she produced a credit of 14,504.2 lb. milk, containing 544.94 lb. fat. Her latest record shows that she has "come back" with a most creditable performance. The photograph of Tehee which appears as the frontispiece of this issue of the *Journal* was taken after her last record, and her appearance suggests that more could be heard from her in the future.

The new milk champion has a dam which, commencing her semi-official test under two years of age, produced 14,786.2 lb. milk, containing 523.03 lb. fat. Her (Tehee's) sire, Woodcrest Johanna Pietje, is a grandson of the two noted cows Colantha IV's Johanna and Pietje XXII. Both of these cows were world's champions on long-distance tests. Woodcrest Johanna Tehee also carries the blood of Homestead Girl de Kol Sarcastic Lad and of Sir Fayne Concordia, and, given an opportunity, it would appear that she could scarcely fail in heavy production. Woodcrest Joe, the Friesian sire at the Central Development Farm, Weraroa, is 100 per cent. the same breeding as the sire of our new champion milk-producer, while Mr. J. Donald's imported bull Woodcrest Pietje Pontiac, and this cow's sire, are from the same daughter of Pietje XXII.

Californian thistle makes good ensilage if cut when in the budding-stage, especially if a little grass is mixed with it. A sprinkling of agricultural salt should be applied to every other layer.

TREATMENT OF FOOT-ROT IN SHEEP.

FROM the number of inquiries recently received by the Department regarding cures for foot-rot it would appear that the trouble is more prevalent this season than usual. The following reply to a correspondent by Mr. A. R. Young, Veterinary Supervisor, is therefore published for general information:—

The cure for foot-rot may take the form of an ointment or solution, but whichever is adopted the feet of all diseased animals should be examined and any loose parts removed.

Ointments are very useful for stud flocks or when only small numbers are to be treated. A good ointment can be made up as follows: Carefully mix over a *slow* fire 1 part of powdered bluestone, 1 of lard, and 2 of Stockholm tar. Another good ointment, which has been for long used in Britain by shepherds, consists of equal parts of powdered bluestone, gunpowder, and lard. The best time to dress is when the feet of the animal are dry. The repeating of the dressing will, of course, depend upon the results.

Where a large number of sheep are to be treated, either for a cure or as a preventive measure, a convenient solution enabling the animals to be run through an ordinary dipping-race possesses the advantage of saving time and labour, and in some respects is preferable to the ointments, as the solution penetrates more deeply into the diseased parts.

A convenient foot-bath can be made in the shape of a stout wooden box, 12 ft. long, 18 in. wide, and 6 in. high, with railed sides, and crossed battens upon the floor so as to prevent the sheep from falling. This bath should be filled up sufficiently to cover the feet only, about 3 in. being sufficient. The animals should be allowed one minute in the bath, care being taken that they splash as little as possible, as such solutions would be harmfully strong were the eyes or mouth to be splashed. The sheep should then be placed in a dripping-pen until their feet are dry—this with a view of preventing poisonous pollution of the grass.

Regarding solutions, any of the following may be tried, and the Live-stock Division will be glad to hear of results, as each has its advocates:—

(1.) Arsenic, &c.: Take 2 lb. white arsenic and 2 lb. carbonate of soda, and boil in half a gallon of water over a *slow* fire until the arsenic dissolves; then add 2 lb. ground sulphur and 5 gallons water, or the same proportion. Before the race is again used for this purpose, if the time exceeds fifty days, its contents should be removed and a fresh supply put in, as all arsenical dips rapidly oxidize and become useless if left standing long exposed to the atmosphere. (Great care should be taken to store arsenic where it cannot be reached by children.)

(2.) Bluestone: Some of the advocates of this treatment place it in efficiency before that of arsenic. It certainly has its advantages, as

1 part of powdered bluestone is soluble in $3\frac{1}{2}$ parts of water without further trouble, and it is less dangerous in its composition. The strength to use is from 2 oz. to 3 oz. per gallon of water as a preventive, and up to $\frac{1}{2}$ lb. per gallon in bad cases.

(3.) Formalin: A 5-per-cent. solution of formalin has been found very successful. This treatment is now largely used in America and Australia, and it appears to have given general satisfaction.

At the Tauranga Horticultural Station this season the potato varieties were sprayed with lime-sulphur only, in strengths varying from 1-120 to 1-95, the operation being frequently carried out in order to give the crop every chance. The result for blight-prevention was favourable in general. Most of the varieties, such as Northern Star, Gamekeeper, and White Elephant showed no blight; Dalmeny Beauty blighted a little; and the only sort which went down was Bresee's Prolific.

A fine lot of young breeding-cockerels of the various poultry-breeds kept are coming on at Ruakura this season under the best natural conditions. The method followed is to locate the birds in the orchard (extending over 13 acres), which is laid down in clover. As sleeping-quarters small houses built on runners are provided, thus enabling the colonies to be shifted to fresh ground whenever desirable. Since harvest the birds have been transferred to the stubbles for a time. A number of the stock will be available for sale shortly, as usual.

During the laying of tile drains on the Department's recently established experimental area at Gore, Southland, a number of mole drains were disclosed which on inquiry proved to be over twenty years old. They were in quite a good state of preservation, although the outlets had become blocked and obliterated. The subsoil of the area is a heavy clay, and the prevalence of rushes and fiorin prior to breaking up the lea indicated a sourness which probably would not have been nearly so marked had the old mole drainage been maintained intact as regards outlets.



WORK FOR THE COMING MONTH.

THE ORCHARD.

J. A. CAMPBELL, Assistant Director, Horticulture Division.

THE main work in the orchard from now on to the end of the season will be in connection with harvesting the apple crop and the late varieties of pears. Spraying will now be easing off considerably, although in the warmer districts no doubt further spraying with arsenate of lead will be necessary, particularly where the leaf-roller caterpillar is at all troublesome.

Where codlin-moth is still likely to cause damage it would be well to remember the advice given last month regarding the last spraying prior to picking. In view of late moth-infection it is inadvisable to allow too long a period between the last application of the spray and the picking of the fruit. Infection at this stage is very difficult to detect, and therefore forms a serious source of danger to stored fruit as well as fruit about to be placed upon the market. There have in the past been many instances of fruit apparently clean when packed having been condemned on the market for moth-infection several days after it has left the packing-shed. The packers of such fruit are invariably of the opinion that they have been badly treated at the hands of the Inspector, whereas the condemnations have simply been the result of late moth-infection, the grubs having developed to a more noticeable extent prior to inspection.

BROWN-ROT.—EXPERIMENTS IN PROGRESS.

Late spraying is also becoming more and more necessary in view of the brown-rot infection of pip-fruits. This disease has created a good deal of discussion during the past few seasons, but it has been mainly connected with the ravages of the disease among stone-fruits. Brown-rot certainly affects stone-fruits more readily than pip-fruits, owing to the softer nature of the former. It is also more difficult to control in stone-fruits owing to the rapidity with which the disease develops on the fruit affected, and also to the limitations that apply to the thorough spraying of fruits of this class. Stone-fruits are usually eaten unpeeled, and on this account late spraying with certain sprays is objectionable, as both the appearance and the price of the fruit is affected when coated with the dregs of some objectionable-looking preparation. Moreover, the foliage of such fruits, particularly the peach and nectarine, is of a very tender nature and will not withstand a spray that can be used with safety on pip-fruits.

As previously intimated, however, brown-rot also affects many varieties of pip-fruits. The P. Barry pear is notably one of these.

With pip-fruits, however, the trouble is not likely to be serious. In the first place, the disease does not progress to anything like the same extent as it does in stone-fruits, and, secondly, stronger spraying-mixtures can be used. Experience, however, teaches that such mixtures should be used throughout the season up to within a short time of picking. Brown-rot is a fungus disease, therefore a fungicide should be primarily used for its control; but as it has been satisfactorily proved, both by observation and actual experiments, that the disease almost invariably affects the fruit through skin-punctures, and that such skin-punctures are mainly due to insects, the addition of arsenate of lead to the fungicide used is likely to prove of considerable value in the control of the disease.

Of the fungicides in use bordeaux mixture is generally given first place, and were it not for the russetting effect it has on the skin of certain varieties of fruits there is little doubt that other fungicides would be mainly restricted to such diseases as powdery mildew, &c. Lime-sulphur and atomic sulphur are very useful fungicides, and are likely—particularly the latter—to play an important part in the future control of brown-rot. Not only are they much less objectionable for the spraying of stone-fruits on the verge of ripening, but they are less injurious to the foliage than bordeaux.

Frequent references have been made in the daily Press recently to the disastrous effects of brown-rot on peaches and other fruits in many of our orchard districts. The articles referred to usually suggest that the Department of Agriculture should take steps to investigate and control the disease. In this connection I wish to state that the Department has been fully alive to the seriousness of brown-rot for the past two or three seasons, and has been investigating and experimenting in the control of the disease. In the month of May last experiments were undertaken by the Horticulture Division in co-operation with the Henderson Fruitgrowers' Association and several fruitgrowers of that district. These experiments are not yet completed. Further experiments of a similar nature are being carried out at the Arataki Horticultural Station, while several of the Orchard Instructors are working in conjunction with fruitgrowers throughout their districts on similar lines. The result of these experiments will be published shortly, when it is hoped that something of a satisfactory nature will be arrived at.

In the meantime, however, sufficient is known of the disease to suggest that it must be taken in hand thoroughly and by all growers in a district alike. Summer spraying is essential, and, owing to the fact that the disease is apt to spread throughout the case after packing, the fruit should receive a strong fungicidal dressing as shortly before picking as the nature of the fruit will permit. The sprays recommended for the summer control of brown-rot are,—

Stone-fruits: Lime-sulphur, 1-120 to 1-125; or atomic sulphur, 8 lb. to 10 lb. to 100 gallons water.

Pip-fruits: Pears—bordeaux, 3-4-40; lime-sulphur, 1-80 to 1-100; or atomic sulphur, 12 lb. to 100 gallons of water. Apples: Lime-sulphur, 1-100; or atomic sulphur, 10 lb. to 12 lb. to 100 gallons water. Late in the season 3-4-40 bordeaux may be used, or the other mixtures slightly increased in strength.

RED MITE AND WOOLLY APHIS.

Summer spraying is often necessary to check such pests as red mite, woolly aphis, &c., until the stronger winter preparations can be used. Red mite is not likely to be very troublesome in cases where either lime-sulphur, atomic sulphur, or Black-leaf-40 has been frequently used. The latter is also effective against woolly aphis, and is on that account becoming a popular spray. Resin-and-soda mixture, although possibly not equal to Black-leaf-40, is a cheap and useful preparation for temporarily checking bad attacks of aphis.

In order to satisfactorily deal with the latter pest it is essential to keep the tree well open and remove useless inside growths. The direct effect of the sun is against the development of woolly aphis, whereas the soft succulent wood shaded from the sun, often to be found on the inside of a young apple, provides ideal food and conditions for this insect.

CITRUS-CULTURE.

Although the area under citrus fruits in New Zealand is, so far, not extensive, the prospects in favour of the development of this branch of the fruit industry appear to be very satisfactory in those districts suitable for the purpose. Citrus fruits, particularly the lemon, can be successfully grown over a large area of the northern portion of the North Island, provided care is exercised in the matter of site-selection. During recent years a comparatively large number of small areas of lemons have been planted in the Auckland District. In view of this, and the possibility of considerably greater extensions in the near future, it is intended shortly to publish in the *Journal* an article dealing with the cultivation, curing, and marketing of the lemon.

THE NURSERYMEN'S CONFERENCE.

The nursery and fruit industries are so closely allied that many of the subjects dealt with at a conference of one of these bodies cannot fail to be of interest to the other, and on the part of the fruit industry this certainly applies to the conference of the New Zealand Association of Nurserymen held at Christchurch towards the end of last month. Among the matters of interest to the fruit industry discussed at the conference were the establishment of a school of horticulture, the urgent necessity of afforestation, a further meeting of the Fruit Varieties Conference at Wellington, the available supply of fruit-trees for planting next season, and the question of fruit-tree grading.

In advocating the establishment of a school of horticulture the conference had in mind the great importance of the many phases of horticulture on the future welfare of the country, recognizing that if satisfactory progress is to be made in the horticultural profession scientific and practical instruction must go hand-in-hand, and to give effect to this an establishment thoroughly equipped and staffed is essential.

Afforestation is a highly important national matter, and its relation to the welfare of the fruit industry in ensuring adequate supplies of fruit-case timber that will be required in the future is of special moment.

The decision to hold a further meeting of the Varieties Conference, the cost of which is to be borne by the Department, is also noteworthy. The fruit industry is rapidly developing, and will in the near future

assume considerable proportions. It is essential that the industry be directed along those lines likely to prove most satisfactory. If varieties are being largely planted that are not calculated after careful consideration to meet all the requirements of the future it is obviously a mistake to continue with them. The previous conference on this matter did very good work, and its report has already removed a vast amount of the uncertainty relative to varieties that previously existed. No doubt the meeting of a similar conference would be of extra value at this stage, even if it did no more than confirm after two years' consideration of the question those varieties previously recommended.

The statement made at the Nurserymen's Conference that there are upward of a million fruit-trees in the New Zealand nurseries suitable for planting during the coming season is of considerable interest when it is remembered that there will be no importations from Australia this year.

The grading of fruit-trees is another forward step decided upon by the conference. To carry this out thoroughly will entail a considerable amount of extra work on the part of the nurserymen, but it will no doubt be well worth the trouble. The object in view is to establish the greatest amount of confidence possible between the raiser and the planter of fruit-trees. I understand that the details of the proposed grading have still to be arranged, but in all possibility they will include the furnishing of each nurseryman raising fruit-trees for sale with a standard set of trees, each tree denoting the minimum fixed for the different grades. If this is done the official standard trees will be kept in a prominent place on the premises of each nurseryman concerned. Under these arrangements a buyer, by actually comparing the trees supplied with that officially denoting the grade, would be afforded ample opportunity of assuring himself that he had or had not received the class of tree he was entitled to.

POULTRY - KEEPING.

F. C. BROWN, Chief Poultry Instructor.

CULLING.

At the present time most poultry plants will be carrying their greatest number of stock, with the consequent risk of overcrowding in several sections. In order that the growing stock may be given the most ideal conditions possible for their best development all surplus cockerels that have reached a marketable age, together with any old hens (excepting those considered really profitable) should be marketed without delay. In view of the high cost of production facing the producer there must be no sentiment in the matter of weeding out any birds that will not show a fair margin of profit over their keep.

Usually in the work of culling old hens the poultryman looks to the moulting stage as a good sign by which the profitable may be distinguished from the unprofitable layers. In other words, they discard

the early moulters and keep the late moulters. This rule, however, cannot be generally applied in a season like the present one, as owing to the inability of many breeders to secure a regular food-supply many of the best birds in the flock have long since moulted. Probably there has been no season in which an early moult has been so prevalent as in the present one. Cases have recently come under my notice in which flocks of high-type layers have practically all moulted, and in many instances have commenced to lay again. This has been due to many things—insufficient food, inferior food, and too many changes in the system of feeding, as well as the common cause of changing the quarters.

It will therefore be seen that where flocks have been subjected to irregular treatment, and an early moult forced upon them, successful culling at the present time demands considerable judgment. In such cases the only safe principle is to cull out all birds showing any weakness in constitution, as well as those which give indications of taking a long period of rest. The shape of the bird gives the best indication as to whether it is laying or about to lay. In a bird about to take her natural rest while undergoing the moulting process it will be observed that the abdomen shrinks as well as the comb, and the bird will appear to have much longer legs than when she is in full laying-condition. Then the width of the pelvic bones is a good guide as to whether a bird will lay in the near future, or whether she is taking the usual rest before moulting. If the bones are close together and the breast-bone close up to them, it is a sure sign that the bird will not lay for some time, and therefore will be unprofitable to keep. On the other hand, if the pelvic bones be well apart, so that they will admit, say, three fingers, and there is a good distance between these and the breast-bone, and the abdomen is full and of fine texture, it may be taken for granted that the bird is laying or will soon commence to lay, and is therefore well worth retaining in the flock until she shows signs of moulting.

It cannot be emphasized too strongly that all birds should be got rid of on the termination of their second laying season before the moulting-period takes place. Of course, an exception must be made in the case of an ideal breeding-hen, as it will pay well to keep such a bird until she is three or even four years old, providing her constitutional vigour does not become impaired. Considering the high cost of production, breeders who have indifferent flocks of birds would be well advised to make a heavy culling, even in the case of the birds finishing their first laying season. For winter-egg production no doubt the pullet is the most desirable bird, and it is unwise to have any birds on the place that make a drain on the profits. The rule of keeping all birds until they have passed two laying seasons will not hold good in these days of dear foods.

WINTER QUARTERS FOR THE PULLETS.

The chief work on the poultry plant in March is to arrange the placing of the pullets in their winter quarters before commencing their season of production. This is very essential, as any sudden change of quarters at the time they are commencing to lay is apt to bring on

a false moult—at the expense of the much-desired winter-egg yield. Of course, the very early hatched birds will probably be laying by now, and, as is usually the case, will produce a few eggs and go into a moult independently of any special treatment they may receive. On the other hand, pullets which have reached a complete stage of development before laying, and which commence to lay about April, will, if properly fed and handled, go right through their first laying season without moulting. Even with birds brought out at the right time there is always a danger of their moulting unless the management is right in every respect. The secret of getting a good winter-egg yield is in making the conditions as similar as possible to those prevailing during the natural laying season. It must never be forgotten that winter eggs are an artificially influenced production, and that artificial methods are necessary to secure them.

In the first place the birds should be put into their permanent houses well before the laying-period commences. These need not be elaborate structures, but should be made in such a way that they are quite draught-proof, and deep enough to warrant the front being practically open. This will allow the birds to roost in comfort, and at the same time have an abundance of fresh air and sunlight—two great essentials in the well-being of poultry-stock. Care must be taken that the floor of the house is maintained in a thoroughly dry condition. The best results cannot be obtained in damp surroundings. To keep a house properly dry it should be filled up with well-rammed earth to at least 6 in. to 8 in. above ground-level. Then, for the pullet to do her best in the cold and wet season ample dry scratching-material should be provided, so that the birds may be fed their grain ration in the litter. This will allow them to exercise in comfort whenever unfavourable weather conditions prevail. The nests should be made ready before laying commences, and a nest-egg placed in each. This will induce the birds to lay in the nests instead of in odd corners of the house—a frequent cause of birds acquiring the habit of egg-eating.

The feeding of the pullets is also important. There should be as little change in the diet as possible. For instance, it is quite common for the substitution of oats for wheat to cause the birds to go into a false moult. The necessity for uniformity in all matters pertaining to the developing layer is therefore seen to be imperative. It is always a good plan not to place the pullets on a heavy meat diet before laying commences. To secure the maximum number of eggs in winter animal food is necessary, but it should be gradually introduced as the birds show signs of starting to lay. When they have well settled down to their laying business meat and its substitutes may, of course, be fed in fairly large quantities, providing it is fed separately from the grain ration. Green food must be liberally supplied, and when such a material as lucerne or clover hay is available it may be chaffed, steamed overnight, and used to bulk up the morning mash, thereby effecting desirable economy.

Strict attention must be paid to cleanliness and the prevention of vermin, the chief preventive for the latter being a good dust-bath. Clean water, grit, and crushed oyster-shell should be always available to the birds.

SELECTING THE BREEDING-HENS.

No time should be lost in selecting the most desirable hens for next season's breeding-pens. Only the late moulters which possess plenty of timber and points indicative of a vigorous constitution should be retained for this purpose. A common mistake made, even by those who realize the importance of breeding only from the best stock, is to leave the work of picking the breeders until after the moulting-period has set in, and therefore mate up birds which should never be bred from. The best time to select breeding-hens is just before they moult. To the man who is a student of laying-type and has an eye for constitution the work of choosing the most desirable birds is then a simple matter. Even the best judges on form will admit that it is next to impossible to correctly judge any character in a bird when she is moulting or has just come through it.

It is always a mistake to choose for the breeding-pen a bird which shows indications that her egg-record has been produced at the expense of bodily vigour. In selecting the best hens it is not so much the egg-yielding capacity that should be studied as the power to provide desirable progeny. There is no better object-lesson in this respect than the condition of the different pens at the end of an egg-laying competition. There will be seen pens of birds which have produced good results, but have practically wrecked their constitutional vigour in doing so. On the other hand, pens are to be seen that have laid as many or more eggs than the former, but have points indicating good health and vigour stamped all over them.

The points to be looked for as indicative of constitution are late moulting, a bold eye, a clean face, a short beak, legs set well apart, tight feathering, and the possession of a very active disposition. Always reject weedy specimens, or those with a long narrow beak, a sunken eye, a long narrow body, and loose feathering, as well as birds above the average weight of the breed. Of course, there are individual birds which conform to all the desirable points looked for in a heavy layer and a good breeder and yet fail to lay satisfactorily. This, however, does not prove the laying-type theory to be wrong. No rule is capable of universal application, and this one can only be applied generally. Usually a post-mortem examination of such birds will disclose some weakness in construction or an abnormal development not observable to the eye.

The eye for form is a natural gift, and a valuable asset to the poultryman who is fortunate enough to possess it. Some people ridicule the idea that there are any outward signs by which the good layer can be detected from a poor one. They are quite right if the work of culling is in the hands of the wrong man—one who has not the ability to properly carry it out. Just as there is a milking-type and a beef type in cattle, so there is a laying-type and a non-laying type in poultry, and a man with any eye at all for form should be able readily to distinguish the two. I realize that it is impossible to estimate from the appearance of a bird the exact extent of her laying-capacity. Especially does this apply to the pullet just before or after she has commenced to lay. It is, however, easy enough to tell towards the end of her laying season whether she has been profitable or whether she will pay to keep for another year.

THE APIARY.

E. A. EARP, Apiary Instructor.

FINAL EXTRACTING.

THIS month will probably see the end of the main honey-flow in most districts, and beekeepers will be wise to remove the last of the honey before the cold nights arrive. Once the honey in the hives has been allowed to become thoroughly chilled there is little prospect of its becoming warmed again when uncertain weather sets in. Wherever inclined to be thick the honey will be found exceedingly difficult to extract unless it is warm, and the beekeeper who delays too long will find that he will have to return to the hives combs almost as heavy as when they were removed. Thin honey extracts best when it is warm, but it is imperative that thick honey be not allowed to cool before extracting.

One of the principal matters to be attended to when the last of the honey is being removed is the condition of the brood-chamber. Many prolific queens keep the brood-chamber so full of brood throughout the season that the bees have very little room to store honey in it. Consequently, if all the honey in the supers is removed, such colonies stand a chance of being starved out before the end of the winter. These colonies should not be reduced to less than two stories, and on no account should their stores be less than 30 lb. to 40 lb. It must be borne in mind that all the brood in the hive will hatch and must be fed, and that in addition the queen will continue laying for some months to come, while in some districts breeding may continue throughout the winter. To ensure the colony coming out strong in the spring it must be left with ample stores to carry it through the months of dearth. Unless there is ample evidence of an abundant autumn flow the beekeeper would be wise to leave his hives oversupplied rather than undersupplied.

BEE-ESCAPES.

For the comb-honey producer the Porter bee-escape is an invaluable aid in the removal of his crop. To remove comb-honey by the ordinary method of brushing, &c., is apt to result in the piercing of many cell-cappings, with consequent leakage; but by the use of this simple little appliance, fitted in a board the size of a super, comb-honey can be removed without any disturbance of the colony. The super or supers should be prized up from the brood-chamber, two or three puffs of smoke driven into the hive, and the board gently slipped into place with the round hole of the escape uppermost. If this is done in the afternoon, by morning the super will be empty of bees.

For extracted honey the use of the escape is a more doubtful matter. In the first place it is of absolutely no avail where there is brood in the super. The bees will not leave the brood, and the morning will find the combs still covered with bees. It might almost be said that the bee-escape is of no use for extracting-combs unless the hives have been previously provided with excluders. In addition, especially in southern districts, the use of the escape-board tends to allow the honey to cool considerably before morning, thereby making the work of extracting a much more difficult proposition. If there is a tendency to rob, the use of the bee-escape will materially assist in removing the

honey late in the season, and whether their use is invariably advocated or not it is as well to have a few on hand.

PREVENTION OF ROBBING.

The taking of the last of the honey is the time when the beekeeper must display endless caution to prevent robbing. A bad attack of autumn robbing is—next to disease—about the worst thing a beekeeper can experience. Before starting the day's work he should have all appliances handy, have formed a plan of how the work is to be carried out, and should, if satisfactory, adhere to that plan throughout the day. A light barrow fitted with a tray to catch honey-drips, and two or three cloths of a size to cover the whole of a super, and moistened with a very weak solution of carbolic acid, are some of the things which will obviate much trouble in the spring. As the combs are removed from the supers they should be brushed and shaken as free of bees as possible, placed in an empty super on the barrow, and covered with the damp cloth. Close every hive as soon as it is finished with, and remove the combs to the honey-house, which should be bee-proof. At the close of the day the wet combs should be returned to the hives as expeditiously as possible, and by morning the apiary will be found to be in its normal condition. No pieces of wax, spilt honey, or anything likely to attract the attention of the bees should be left uncovered.

If the bees show a tendency to pounce on any particular hive contract the entrance considerably and pile wet grass in front of the hive. If working in one portion of the apiary should cause robber bees to become too attentive it is advisable to shift the scene of operations to another part. It must be borne in mind that autumn robbing once commenced is hard to check, also that it is usually brought about by careless manipulation of the hives.

WEAK COLONIES.

As far as possible weak hives should not be tolerated during the winter months. During the warm days these stocks rarely escape the attention of robber bees and are easily molested. Once they are attacked it is exceedingly hard to save them, and despite the efforts of the beekeeper they eventually get robbed out. It is usually the presence of weak hives in the apiary that starts autumn and winter robbing, and it is by far the best plan to unite them with stronger colonies in the apiary and avoid the risk of creating a disturbance among the bees when normal winter conditions should prevail. If weak colonies are not detected until late in the season a good plan to follow when uniting them is to put the weak hive on top of a strong one, placing a piece of newspaper between the two hive-bodies. In the course of a few days the bees in the weaker hive will eat their way through the paper and unite peaceably with the bees in the stronger hive. The surplus combs may subsequently be removed and the hive made snug for wintering. If weather conditions permit it is advantageous to destroy the queen in the weaker hive prior to uniting.

PREPARATIONS FOR WINTER.

As soon as the last of the honey is removed the beekeeper should see that the colonies are in good order for wintering. The first matter

for attention is that of stores, which, as already indicated, should be abundant; the second that of the queen's condition. After these two important matters are settled the beekeeper should satisfy himself that his hives are watertight and draught-proof, also that his apiary is well provided with shelter in the form of good hedges or other wind-breaks.

With regard to the queen, autumn is the time when strict attention should be paid to weak and failing queens. None but the best queens should be allowed to go into winter quarters. Poor queens should be destroyed, and either superseded by young and vigorous ones or their colonies united with those of the better queens before the winter sets in. No queen should be tolerated who cannot provide the colony with an abundant supply of young workers before the cold weather arrives. It is quite certain that the queen that goes back in the autumn will be in worse case after the winter, and will not produce enough workers to provide a surplus in the following season, even if she does not fail entirely before the spring or develops into a drone-layer as soon as brood-rearing commences.

MARKETING THE CROP.

Before the honey is finally run out of the tank the beekeeper should have decided on which market he intends to place his product. If export is his aim the market is comparatively simple, as only large packages are required; but where the local trade is to be catered for it is wiser for him to put the honey up into small packages himself. Rehandling means remelting, and unmelted honey is the better article. In addition, if the honey is not to be sent overseas the producer owes it to himself to sell it under his own name and trade-mark. This will soon prove the best form of advertisement, and, coupled with a reputation for care and cleanliness, will ensure quick sales and good prices.

Everything should be done to make the article as attractive as any other food product, and proportionately as much care given to the intricate result of beekeeping as to the bees themselves. The Sale of Food and Drugs Act requires the honey-producer to label his packages and to state thereon the contents and weight. Apart from this requirement being a necessity as representing a fair deal with the consumer, it has also done good work in disposing of old-time haphazard methods of marketing honey, and has helped to force on beekeepers the necessity of studying the commercial side of the industry.

CARE OF COMB-HONEY.

There are factors in the proper treatment and care of comb-honey which the producer is apt to overlook when putting his honey on the market. Usually the practice followed is to despatch the crop to market, where it is sold, to be afterwards graded and cleaned by buyers who are alive to the demands of the local market. These buyers obtain a better price by grading and cleaning the comb-honey, whereas the producer can by employing proper methods demand an increased price. Comb-honey should be fully capped before taking from the hive, and it should not be left until its white appearance is destroyed by travel-stain, this being caused by the constant traffic in the hive. When the sections are removed they should be stored in a warm, dry room, as low temperatures hasten granulation, and granulated comb-honey is not likely to meet with ready sale. Moreover, comb-honey

stored in a cold, damp place is apt to "weep" (or absorb moisture from the atmosphere), forming beads on the surface of the comb, and in the course of time becomes sour, thus destroying its marketable value. As opportunity allows, the sections should be cleaned of all propolis and stain, and this is best done by scraping the sections with a knife and the operation finally completed by sand-paper. Care must be exercised not to damage the cappings of the comb and thus destroy its attractiveness.

Before forwarding the honey to market it should be carefully graded and finally packed in cartons for the market. By the use of cartons the sections are secured from dust and insects, and present an attractive appearance when offered for sale, besides being far less liable to breakage. In order to ensure safe transit, excellent shipping-cases can be purchased from the hive-dealers. These cases are fitted with corrugated-paper cushions which materially reduce the breakage from rough handling. A feature of these section-crates is a sliding cover which enables the honey to be readily examined. The crates are appreciated by the retailers, and at the same time help to increase the average price to the producer.

VITICULTURE.

S. F. ANDERSON, Vine and Wine Instructor.

THE VINEHOUSE.

THE grower would do well to note the following points at this period of vine-growth and ripening of the late grapes: Firstly, there is a decided advantage in having the rods quite 18 in. from the glass. The wires should be this distance, and the vine-rods fastened to them below by some material that will not afford insects cover for collecting or laying their eggs. Lead wire is suitable for this. This space is required for obtaining the best results, with less scalding of the leaves by their being pressed up against the glass, and better opportunity of controlling the growth.

Black Hamburgh and most early black grapes do not require much light to colour perfectly. The glass may be quite obscured by the foliage. The perfect colouring depends on the vine being not over-cropped and well supplied with foliage, provided it is not overcrowded between the rods and the glass, which is very often done. An exception with black grapes is the Gros Colman, which is a late ripener and should have more room and light. The sun-heat has decreased considerably before it has had time to mature. Therefore to assist the ripening of such late varieties the admission of more sun by parting the foliage is recommended. This must be done with care, to prevent sudden exposure of the fruit to the direct rays of the sun, as that may cause scalding. With late white, or more properly amber-coloured, grapes, particularly Pearson's Golden Queen, more light is required to bring them to perfection.

It should be noted that scalding is prevented to a great extent by free circulation of air. This must be given entirely by top ventilators till the fruit is fully coloured. On very hot, still days the door away

from the wind may be opened and water thrown about the floor to lower the temperature.

VINEYARD AND CELLAR.

March being the vintage month, a few reminders may be given on the chief points in connection with the latter. Good wine can only be made from perfectly ripe grapes; therefore do not commence gathering the fruit till it has attained its highest percentage of sugar. Frequent tests of the must are therefore necessary. With the exception of Golden Chasselas it is usually quite safe to leave all grapes grown in this country till the end of March, provided an increase is going on in the saccharine. After that time (subject, of course, to the season) there is scarcely any increase. Rain and birds are the two great troubles at this time. The latter may be controlled to a great extent by bird-scarers, but the rain cannot be controlled. If the weather is showery strip the lower leaves off, exposing the fruit; it will then dry quickly and much rotting be prevented. Where the vigneron has the convenience for doing it an improvement can be made in the wine by drying the grapes on benches, floor, or in a loft for twenty-four hours or so before crushing. A considerable quantity of moisture can be driven off in this way. Arrange the work, if possible, so that a vat is filled with a day's work. Fermentation will then start in the night, and during the day it can be watched.

Test the contents of the vat with the thermometer from time to time. The must will in all probability rise to a temperature of 80° to 95° F. Above this it should not be allowed to go, and to prevent a further rise draw off at tap and spray over the top. The fermentation should not be too rapid. Of course, in managing this much depends on the daily temperature; but, stated briefly, wine made at a low temperature will be a better colour, and contain more alcohol and less deleterious germs than when left uncontrolled.

THE GARDEN.

W. H. TAYLOR, Horticulturist.

VEGETABLE - CULTURE.

PLANTING of all the brassica tribe—which includes cabbages, savoys, broccoli, cauliflowers, &c.—should be completed as soon as possible. In all parts of the Dominion except the warmer districts early in February is really quite late enough. Planting at the present time is usually in dry soil and with considerable sun-heat. Frequent watering may be practicable in some cases, but in others—particularly with large plantings—it is not. Watering, however, is not necessary except in places where there is extreme heat. My own custom is not to water at all, and I find it best not to do so. The plants are stood in a tub containing two or three inches of water, and in an hour or so they become well charged with water and are ready for planting. The plants are taken from the tub in bunches. A handful of mud is lifted from the bottom of the tub and rubbed over the bunch of roots,

this protecting them from the sun during planting. The plants are put in with a short-handled hoe. First flick off the dry surface soil, drive the hoe in the soil, pull it to you so as to make an opening behind, insert the roots of a plant in the opening, withdraw the hoe, and with the head of it give a smart punch to the soil to close it in about the roots of the plant. I have never found it necessary to water plants put out in this manner.

Leeks may still be put out provided they are large plants. Silver-beet may still be sown, or spare plants from an earlier sowing may be put out. In most places this plan may be best. Spinach sown now will be in good time except in cold places. The plants should be thinned as soon as they can be handled; they require to be at least 8 in. apart. This crop will produce leaves all winter.

Turnips may be sown for winter use about the middle of March, and a good breadth should be put out. It is a good plan to sow two kinds, a white for first use and a yellow-fleshed variety for later use, as the latter stand longer than white sorts. The yellow-fleshed sorts are valuable in winter, having a superior flavour during those months. Sow thinly to save labour in thinning. Those plants that are to stand long must have room to develop. The rows that are first drawn from can be thinned by pulling the roots for use, and very little special thinning will be needed if the seed is not put in too liberally.

Celery should be ready for moulding-up. Be careful to keep the stalks upright and close together, so as to prevent soil getting to the hearts. Pack the soil firmly round the base of the heads, so that there may be no sinkage of the bank of soil, which might buckle the plants and cause pithy stems.

Tomatoes: Late fruit is often secured in mild climates by allowing the top growth to run. The plants should produce till stopped by frost.

Sea-kale beds should be cleaned by removing all dead leaves and weeds. Good exposure to light and air will mature the crowns.

Potatoes may be dug and stored in a dry shed. It is a good plan to sprinkle a little air-slaked lime over the tubers; this hardens the skin and prevents moisture from collecting on them. The ground occupied by potatoes may be utilized for winter crops.

Diseases and Insect Pests.

Celery-rust gives trouble in some places, and once the disease obtains a good hold it cannot be cured. In the early stages affected leaves should be cut off, and the plants at once sprayed with bordeaux mixture. A small louse sometimes attacks celery. The remedy is to spray with an insecticide, such as Vistolene or XL-All fluid, applying the spray as soon as an attack is noticed. The insects suck the juices of the plant and soon cause the leaves to wither. Nothing can be done when that stage has been reached. The same or similar insects attack carrots and parsnips—the same remedies are effective.

Cabbage-fly: This term (which is a wrong one) is usually applied to the diamond-backed moth, the larvæ of which attack all plants of the cruciferous family, including the cabbage tribe, turnips, and the stocks of the flower-garden. Preventive measures—the use of tar-water—have been described at seasonable times in the *Journal*. It is now too late for the use of preventives. Fortunately there is not much evidence of the pest this season; there never is when showery

weather prevails. Various remedies have been tried to fight the larvæ, but all are useless unless there is growing weather. Growing weather is showery weather, and then the moths are not present in devastating numbers. Still, there may be enough of them to do harm, for the grubs always attack the tender heart-leaves of the plants, and by injuring them prevent development. In such cases I have found the best remedy to be hellebore powder dusted into the heart of the plant. Spraying with kerosene emulsion and arsenate of lead has been extensively tested. When the season is very dry and plants make but little growth these compounds injure the plants. Combined with irrigation they would be useful, but not otherwise, and they are not wanted in showery summers. Hellebore powder answers well and is less trouble.

Cabbage and turnip aphid may be treated with weak kerosene emulsion, about 1 in 15, but Vistolene is safer and more certain in action. On brussels sprouts the large grey aphid is best treated by forcible syringing with boiling water. A coarse nozzle should be used, so as not to divide the water finely, which would cool it too much.

SMALL FRUITS.

Strawberries being past bearing should not on that account be neglected. Spare runners should be pulled out, and the soil between the rows ploughed to a depth of 6 in. and afterwards broken down.

Passion-fruit.—For new plantations plants should be raised from seed put in under glass. The young plants should be transferred to 3 in. pots and kept in them till planting-time. Spring will be the best time to plant, as even if there is no danger from frost the plants will make little or no growth during winter, and it is best not to plant until growth shortly follows planting. To support the vines erect a fence with two wires, the top wire about 4 ft. from the surface of the soil. The vines are led up and trained along the wires, from which they hang down in a natural manner. Systematic pruning is rarely resorted to. The usual practice is to top off straggling growths with a sickle and let the rest alone.

Loganberries.—The old fruiting-rods should be cut out as soon as the fruit is done. This will leave room for the proper development of the new rods. They have to be cut out later in any case, so it is best to do it at once.

Cape Gooseberries.—For future planting it is best to raise the plants during autumn. Strong plants are then ready to put out in spring, and a much better crop is obtained the first year than is possible from spring-sown plants. Raise the seedlings in boxes, and transplant to other boxes when large enough to handle, placing them about 2½ in. apart. Let the plants remain in the boxes till spring frosts are past, then plant out.

Raspberries.—All the old fruiting-canes should be removed. So far as my experience has gone raspberries are seldom troubled with disease in this country, at least not to a damaging extent; but when exposed to salt-laden gales off the sea they are liable to be severely injured. The salt burns holes in the leaves and kills young shoots, sometimes causing the loss of the entire crop. It is not advisable to make extensive plantations until ample shelter is provided.

ANSWERS TO CORRESPONDENTS.

IN every instance a question to which an answer is desired in the *Journal* must be accompanied by the full name and the postal address of the inquirer, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

INJURED TEAT IN COW.

"NEW CHUM," Havelock North:—

About two months ago my cow in jumping over a barbed-wire fence injured one of her teats badly. I treated it as well as I knew how, and it has healed in a short time. She is now in full milk, and from that teat the milk flows from a small hole in the side, thereby showing that the milk-passage is still broken. Would you kindly advise me what to do.

The Live-stock Division:—

An operation will have to be performed. This consists of making a fresh wound, dissecting back the skin for a short distance, then stitching the wound up and covering with collodion. We would therefore strongly advise you to call in a veterinarian to do this, as there is a risk of the closing of the normal milk-duct if not carefully protected.

FEEDING JAPANESE MILLET.

CLIFFORD BROS., Lepperton Junction:—

We have a promising crop of Japanese millet which we propose to soil out to cows for green feed, but understand there is some risk unless the feed is cut and wilted before feeding out. We should be obliged for any information in this connection.

The Fields Division:—

The risk involved in feeding out sorghum forage does not apply to Japanese millet. It may be quite safely fed as proposed.

WALNUT-DISEASE.

K. H., Nelson:—

Kindly let me know the cause of walnuts dropping when green and going black inside; also what is the best thing to do to prevent this.

The Horticulture Division:—

The disease is bacterial, and no cure is known. It does not appear every year; doubtless a rainy season favours it. The trouble is becoming widespread in America, where walnuts are widely cultivated, and there they are raising blight-proof trees by working them on the Californian black-walnut, which is immune from the disease.

SCALDING POULTRY BEFORE PLUCKING.

FRANK WALSH, Tikokino:—

Is it detrimental in any way to the flavour of poultry to scald before plucking?

The Live-stock Division:—

Scalding does practically no harm to the flavour if the bird is intended for boiling purposes. In the case, however, of a roasting-carcase, this method undoubtedly reduces the flavour, chiefly for the reason that the skin cracks during the cooking process and allows the flavour to escape. Especially does this apply if the birds are not cooked at once. Scalding is most objectionable where the carcasses are to be exposed for sale, having the effect of giving them a soft, flabby appearance, which reduces their market value.

COW WITH BLOOD IN MILK.

"FARMER JOHN," Te Awamutu:—

I have a dairy cow (not a heavy milker) in full milk, and at times we find a sediment of blood in the milk-pan. This has continued during the two seasons we have milked her. This is her second calf, and she seems to be losing her condition. Can you tell me the cause of the trouble, also what would be the best treatment, if any?

The Live-stock Division:—

The usual cause of blood in milk is the rupture of a small blood-vessel inside the udder, and for which there is no cure. We could recommend agents that would cause the bleeding to cease, but as these same agents would act similarly upon the other blood-vessels they would have an injurious effect upon the production of milk. Taking into consideration that this is the second season in which the animal has shown blood in the milk, we would advise you to dry off the affected quarter; in fact, seeing that she is not a heavy milker it would pay you better to dry her off altogether and dispose of her.

MANURIAL TREATMENT FOR PEATY SWAMP LAND.

H. H. H., Patea:—

What manures would you advise for peaty swamp land, and when should they be applied?

The Fields Division:—

Lime—ground burnt lime at the rate of 1 to 2 tons—is required as a rule for drained peat-swamp land. Apply this in the autumn or early winter. Basic slag or Ephos phosphate or basic superphosphate will be found to give good results on such land. The manure should be applied at least two months before sowing the seed, if feasible, otherwise apply it at the time of seeding.

INFESTATION BY DRY-GOODS BEETLE.

D. D. HENDERSON, Halcombe:—

For some months I have noticed the presence of small insects somewhat like small ants (as per specimens forwarded) in a shed filled with chaff. From this they have spread till they infest the chaff-shed, stable, cow-shed, granary, &c., and have even made their appearance in the house. I should be glad of your advice as to the best method of exterminating them.

The Biologist:—

The insects sent are an introduced beetle known as *Silvanus surinamensis*, common in stored dry-goods. Treatment is difficult, especially when many buildings are affected. Fumigation with carbon bisulphide, provided any of the premises can be made airtight, is efficacious, but is generally not practicable. One of the most effective methods of getting rid of the insect is to constantly move the affected material and sweep out the sheds, spraying the floors and walls with a solution of Kerol or similar disinfectant. The affected chaff should be used as soon as possible, and at least one shed should be thoroughly cleaned out, so as to be able to use it for fresh material. The actual harm done by this insect is not great, and it is mainly its presence in large numbers that causes annoyance.

TREATMENT FOR BARKED TREES.

C. E. N., Halcombe:—

During my temporary absence some animal—a pig, I think—broke into my orchard and very badly damaged several of my best trees. Beginning about 1 ft. from the ground 2 ft. of the bark has been completely torn off. The trees are covered with fruit, and if you can advise me how to save them I shall be very glad.

The Horticulture Division:—

If the bark of your fruit-trees has been torn off all round the trunk you cannot save the trees. You may possibly save the fruit that is on them, but it will not mature perfectly. It is advised that cow-dung and clay be mixed together in equal proportions to make a thick plaster. Having first trimmed off the rough edges of the torn bark with a sharp knife, cover the bare parts of the trunks with the plaster. Over the plaster wind a strip of old sacking cut 6 in. or 8 in. wide and tie it on. Badly barked trees have been saved by this treatment when a strip has been left uninjured and the protection given at once.

OATS VARIETY FOR WINTER FORAGE.

J. SCLATER, Karori, Wellington:—

Kindly inform me which is the best variety of oats to sow for winter green feed in clay soil.

The Fields Division:—

There is no better variety than Algerian for your situation. If possible, secure Australian seed of Algerian, which seems to be less liable to red-leaf on wet clay ground.

APRICOT-TREE DROPPING NEWLY SET FRUIT.

"GARDENER," Otaki:—

What is the cause of an apricot-tree (Royal) dropping its blossoms and not fruiting?

The Horticulture Division:—

There are various reasons why an apricot-tree may drop its newly set fruit. It may be due to disease-attacks, and the remedy in such cases is early spraying, as advised at seasonal times in the monthly orchard notes published in the *Journal*. The trouble may also be caused by excessive rain, or excessive rain in conjunction with badly drained and cold subsoil.

WESTERN WOLTHS RYE-GRASS FOR COW FORAGE.

D. DAVIS, Ashhurst:—

Do you think Western Wolths rye-grass will do for cutting in the winter for cow-feed instead of oats, which are usually grown? Oats here go rusty, which spoils them for milking purposes.

The Fields Division:—

For cutting or grazing it is probable that Western Wolths rye-grass is as good winter cow-forage as any cereal, especially on your class of land. A mixture of 20 lb. to 25 lb. of Western Wolths and 3 lb. to 5 lb. of red clover has the following advantages: (1) Abundant good Western Wolths forage for cutting or grazing up to the beginning of October; (2) continuation of grazing up to December or a good hay crop if shut up; (3) excellent clover forage for cutting, grazing, or haying in January and February.

WARTS ON COW'S TEATS.—DOG TROUBLE.

"ANXIOUS," Taradale:—

1. What is the cause of warts on a cow's teats? Is there any cure; and, if so, what is it?

2. My cattle-dog is about four years old, and for some time past his coat has been dull and brownish, and he scratches terribly, often taking pieces of skin off himself. The nose is hot and dry and sometimes bleeds freely from the right nostril. He is as active as ever and has a good appetite. I have been giving him a tablespoonful of salts night and morning, and a good wash once a week with soap in a strong, warm solution of Murton's sheep-dip. I have also applied a mange lotion several times. Sometimes he appears to be much better for a day or two, and then starts scratching again. Advice would oblige.

The Live-stock Division:—

1. The cause of warts is any agent interfering with the normal functions of the epithelial cells: thus hereditary tendency plays an important part. Where a cow is in full milk caution must be adopted as regards removal, otherwise the milking operation might be interfered with. It is a sound practice not to try to remove them until the animal is about dry. Meantime, keep the affected teats liberally smeared with pure olive-oil. When the cow is about to dry off, the warts should be removed by the aid of a pair of sharp scissors, and the place touched with caustic. When they are flat, and not in the way of milking, it is best to leave them alone.

2. The trouble in the dog may be due to worms. Give a dose of ténaline, which can be procured from any chemist. Administer in the proportion of one drop to every pound of the dog's weight. A useful skin-dressing is obtained by mixing 2 oz. of ground sulphur with 6 oz. of vaseline, or that proportion. Apply all over the body.

LOSSES IN ORCHARD-PLANTING.

"ORCHARDIST," Garston:—

Kindly inform me what you consider a fair proportion of deaths per 1,000 trees in a young orchard for the first year after planting.

The Horticulture Division:—

Provided the land is suitable and properly prepared, losses should be merely nominal. Five per cent. would be a very heavy loss.

GRIT AND GRAIN MILL FOR POULTRY.

L. N. LAKE, Ohinemutu:—

Kindly let me know the approximate cost of a Wilson grit and grain mill (as illustrated in the Department's bulletin, "Utility-poultry Keeping," and used at the Milton Poultry-station), and where it could be obtained. Also please say whether the machine requires a concrete floor to stand on, and whether a 2 or 3 horse-power engine would run it.

The Live-stock Division:—

A similar mill may be obtained from the A. and P. Food Company, Davis Street, Wellington, or J. B. Merrett, Box 588, Christchurch, at a cost of about £35. A concrete floor for it to stand on is not necessary. So long as it is well screwed down to thick timber, resting on a solid bed, that is all that is required. The machine can be worked with a 2 or 3 horse-power engine.

FORTHCOMING AGRICULTURAL SHOWS.

Franklin A. and P. Association: At Pukekohe, 22nd and 23rd February.
 Taranaki Agricultural Society: At New Plymouth, 27th and 28th February.
 Whakatane A. and P. Association: At Taneatua, 27th February.
 Ohura A. and P. Association: 28th February.
 Hawke's Bay A. and P. Society: Autumn Show at Hastings, 6th March.
 Marton District A. and P. Association: At Marton, 6th March.
 Opotiki A. and P. Association: At Opotiki, 7th March.
 Rotorua A. and P. Association: At Rotorua, 13th March.
 Ashburton A. and P. Association: At Ashburton, 14th March.
 Temuka and Geraldine A. and P. Association: At Temuka, 14th March.
 Matamata A. and P. Association: At Matamata, 21st March.
 Hawarden A. and P. Association: At Hawarden, 28th March.
 Oxford A. and P. Association: At Oxford, 4th April.
 Methven A. and P. Association: At Methven, 11th April.
 Otago A. and P. Society: Winter Show at Dunedin, 28th to 31st May.
 Waikato Winter Show Association: At Hamilton, 4th to 8th June.
 Manawatu and West Coast A. and P. Association: Winter Show at Palmerston North, 18th to 21st June.

THE GOVERNMENT WHEAT-PURCHASE SCHEME.

THE following abstract, kindly contributed by Mr. W. G. McDonald, Wheat Controller, gives the salient features of the recently instituted scheme of purchase and sale of wheat in the Dominion by the New Zealand Government. The Orders in Council and detailed regulations governing the scheme were published in a special *Gazette* dated 22nd December, 1917. Mr. McDonald states,—

The whole object of the scheme is to protect the consumer against undue inflation of prices, while at the same time giving the farmer the full return for his industry.

Estimated Yield of Crop and Requirements.—In the first place an estimate has been obtained by the Department of Agriculture showing the acreage under wheat crop on 31st December, 1917, and the probable yield in bushels. Secondly, all the flour-millers of the Dominion have supplied returns of wheat consumed by them for the past three years, their stocks of wheat and flour, and a note of their requirements up to the end of February, 1918.

Millers' Quotas.—From the foregoing and other data each miller will be allotted a certain quantity of wheat for the year. This "quota" will not be finally decided till all the threshing returns are in, showing the actual yield as against the farmers' estimates.

Millers' Warrants to purchase.—Such proportion of each miller's quota as the threshing returns justify will be stated on warrants and issued to the miller. Present indications are that 4 bushels of Tuscan will be available for every bushel of Hunters and every bushel of Velvet wheat. Accordingly the warrants are at present issued in that proportion.

Brokers.—Farmers can sell good milling-wheat only to a miller through a licensed Government broker, but any grain-merchant who has been dealing with farmers for any reasonable period in the past, and who deposits £500 (in form of bank guarantee, War Loan or other approved securities) and enters into a bond of £1,000, is eligible for appointment as a licensed Government broker in his usual district. Upon production of a miller's warrant the broker arranges a deal between a farmer and the miller, fixing the place and time of delivery, the price of sacks, and suchlike matters. The miller signs a contract to purchase and the farmer a contract to sell, which also gives the broker authority to receive the purchase-money from the Government on the farmer's behalf.

Payment.—When wheat is delivered to the miller he must pay therefor within seven days. The broker lodges this money in the Public Account, and sends the bank receipt and the miller's invoice to the Wheat Controller, together with the farmer's account sales or credit notes and the stamped copy of the farmer's contract of sale. The Controller on receipt of these sends the broker a cheque, with which the broker pays the farmer (being careful not to pay for any wheat under registered lien).

Prices.—The farmer receives 5s. 10d. per bushel f.o.b. in January, February, and March, and thereafter an extra $\frac{1}{2}$ d. per bushel per month until the top price, 6s. 1d., is reached in September. The miller pays the farmer's price plus $1\frac{1}{2}$ d. per bushel, out of which $1\frac{1}{2}$ d. the whole scheme is financed, the broker getting 1d. commission and the Controller $\frac{1}{2}$ d. for office expenses. The scheme is therefore self-supporting and costs the country nothing.

North Island Prices.—There being comparatively little wheat grown in the North Island, and the shipping-expenses from the South Island to the North being heavy, an extra 4d. per bushel is allowed to the North Island farmers in order to put the North Island millers on the same footing as those in the South Island.

Fowl-wheat.—The maximum price of fowl-wheat payable to the farmer is 2d. per bushel less than for good milling-wheat, and the wholesale selling-price is 1d. less than the farmer's price for good milling. The farmer cannot sell fowl-wheat till a Government broker has condemned it as unfit for milling. The wheat then becomes "free." Any purchaser other than through a licensed Government broker must furnish a return within seven days, showing from whom he purchased it, the quantity, and the price. The retail price has so far not been fixed.

Seed-wheat.—The maximum selling-price of seed-wheat has been fixed at 5d. higher than good milling, and machine-dressed seed 5d. higher still. At the end of the sowing season the Controller can requisition all unused stocks for milling.

Storage.—The miller can be required to take up to the full storing-capacity of his mill at any time, and if the storage-capacity is unduly low he may be compelled to increase it. The Government undertakes no storage, and desires to relieve the farmer in this respect.

Sacks.—These are extra, but the maximum price allowed is 10½d., which was the figure recommended by the South Island brokers.

Disputes.—Disputes as to quality are settled by the appointed Government Grader. Other matters are decided upon by the Controller.

Control of the Scheme.—The scheme is in the hands of the Wheat Controller, Mr. W. G. McDonald, of the Board of Trade, assisted by Mr. W. S. Pratt, late chief salesman of the National Mortgage and Agency Company, Christchurch. Mr. H. S. Cordery, of the Customs Department, has been appointed Accountant. These officials are supported by advisory committees representing the farmers, the brokers, and millers. The three committees usually confer separately, but on occasion will meet as a joint committee.

PURCHASE OF FROZEN MEAT, CHEESE, AND BUTTER BY THE IMPERIAL GOVERNMENT.

(Contributed by the Department of Imperial Government Supplies.)

I. FROZEN MEAT.

THE first intimation of the desire of the Imperial Government to exercise some control over the export of frozen meat from the Dominion was conveyed by telegraph through the Secretary of State for the Colonies on 10th February, 1915, and as the result of a conference convened to discuss the proposal an offer from the Dominion was cabled to the Imperial authorities on 22nd February of the same year. This offer was formally accepted on 2nd March, and on the following day particulars of the arrangements concluded were gazetted and the purchase on behalf of the Imperial Government commenced.

PRICES.

A schedule of f.o.b. prices for the various classes of meat to be purchased, including all exportable beef, mutton, and lamb, was drawn up and gazetted on 3rd March, 1915, and the prices then fixed continued in operation until 20th October, 1916, when all meat from stock slaughtered after that date was purchased on the basis of the schedule as under :—

No.	Description.	Prices now in Operation. d.
1.	Wethers, first quality, 72 lb. and under	5 ³ / ₈
2.	„ first quality, over 72 lb. and up to 85 lb.	5 ¹ / ₈
2A.	„ first quality, over 85 lb. and up to 98 lb. (subject to special approval by the Inspector)	4 ⁷ / ₈
3.	„ second quality	5 ¹ / ₈
4.	Ewes, first quality, 72 lb. and under	4 ⁵ / ₈
5.	„ first quality, over 72 lb. and up to 85 lb.	4 ⁵ / ₈
6.	„ second quality	4 ⁵ / ₈
7.	Lamb, specially prime and Canterbury quality, 42 lb. and under	6 ¹ / ₈
8.	„ first quality, 42 lb. and under	6 ¹ / ₈
9.	„ first quality, over 42 lb.	6 ¹ / ₈
10.	„ second quality	6 ¹ / ₈
11.	Beef, prime ox	5
12.	„ second and heifer	4 ³ / ₄
13.	„ boning in quarters	4 ¹ / ₄
14.	„ cow, prime	4 ¹ / ₄
15.	„ cow, second	4 ¹ / ₄
16.	„ boneless	5 ¹ / ₄
17.	Mutton, legs	6 ¹ / ₈
18.	„ shoulders	5 ¹ / ₈
19.	„ loins	5 ³ / ₈

These prices are fixed for the period of the war and for at least three months after its termination.

STORAGE.

In addition to the prices quoted above, storage at the rate of $\frac{3}{4}$ d. per lb. per month, with a maximum of three months, was allowed on all meat in stores after the first month until 31st October, 1916, when, with the introduction of the increased schedule referred to above, the storage charges were reduced to $\frac{3}{8}$ d. per lb. per month, also for a maximum period of three months and with one month's free storage.

These provisions for storage continued until 30th April, 1917. From 1st May, 1917, the maximum period of three months was removed, and storage is now payable on all meat in store after the first month until date of shipment, and is payable on the basis of "first into store, first out."

PAYMENT.

Payment for all meat is made at the time of shipment on presentation of shipping documents, including invoices, bills of lading, grading-certificates, and nomination certificates, to the Department by the freezing companies concerned. The grading-certificates referred to furnish particulars of the various grades and weights of meat shipped, and are countersigned by the principal Government Meat Inspector at the respective freezing-works. Payment is made within twenty-four hours of the receipt of the documents, the majority of which reach the Department by draft through the various banks trading in the Dominion.

In some cases payment of the full proceeds of each shipment is made direct to the freezing company concerned, and in others the total of the invoice is apportioned by the freezing company between the various clients concerned, and the amounts of these apportionments are remitted direct to the clients free of exchange at the points required. This latter procedure was instituted with a view to obviating the necessity for preparing separate bills of lading and shipping documents for the shipments of individual clients, and in addition to avoiding much unnecessary labour it has resulted in prompter payment being effected to the clients concerned.

NOMINATION CERTIFICATES.

As all meat shipped is not invariably required by the Imperial authorities for naval and military purposes, a certain proportion of New Zealand shipments have been released for sale on the United Kingdom markets, and such sales have been effected through agents appointed by the British Board of Trade on a commission basis. The nomination certificates attached to shipping documents at this end indicate the agent through whom it is desired the meat should be sold in the event of its being released for private consumption. This provision in the arrangements has been taken full advantage of, and very few shipping documents going forward are not accompanied by relative nomination certificates.

SHIPMENT.

Shipment is effected in refrigerated steamers provided by the Imperial authorities through the London Tonnage Committee, and the space thus made available is apportioned by the New Zealand Overseas Shipowners' Committee, sitting in Wellington. This committee consists of representatives of the various overseas shipping companies trading in New Zealand and Mr. R. Triggs as representative of the New Zealand Government.

For the purpose of affording a reliable basis of allocation, and as an indication of the requirements of each district, periodical statements are furnished to the New Zealand Overseas Shipowners' Committee, showing the quantity of meat available at the various works throughout the Dominion, and on the basis of these returns allocations are made by the committee and advices sent to the freezing companies concerned. Such allocations are invariably made sufficiently far in advance to allow time for preparation of shipments.

In addition to shipping meat purchased by the Imperial Government—i.e., beef, mutton, and lamb—freezing companies are permitted to make use of 5 per cent. of the space allotted to them in each steamer for the shipment of frozen offal, sundries, &c., on owners' account.

INSURANCE.

As a result of recent negotiations with the Imperial authorities the conditions regarding insurance have been substantially altered, and the Imperial Government now assumes ownership of all meat as soon as it is placed in the freezing companies' chambers in good order and condition. Companies are still required, however, to effect insurance cover for the first four months after slaughtering, and such

policies are maintained at the companies' costs and charges for the period referred to. If any policy is for a period exceeding that for which the company is bound to keep the meat covered the Imperial Government will refund to the company a proportionate part of the premiums payable on such policy, based on the period during which the policy exceeds the four months mentioned.

II. CHEESE.

The first requisition of cheese produced in the Dominion represented one-third of the output during the season 1915-16, and totalled approximately 15,000 tons. This quantity was purchased and paid for at a price of 7½d. per pound, and comprised first-grade cheese only.

In 1916-17 the whole of the output was purchased, this time on the basis of 9½d. per lb. for first-grade cheese and 9¼d. per lb. for second-grade cheese, payment being made at the time of shipment, with provision for an advance up to 90 per cent. in respect of all cheese which had remained in store for a period exceeding twenty-eight days. Insurance risks from factory-door to free-on-board were in this case accepted by the Imperial authorities.

For the present (1917-18) season the whole output has again been requisitioned at a price of 10d. per lb., with a reduction of ¼d. per lb. for second-grade cheese, and, in addition, the Imperial Government has agreed to purchase all dairy cheese at 8½d. per lb. for first-grade and 8d. per lb. for second-grade, all prices being for delivery f.o.b. ocean steamer.

Insurance in this case up to the point of delivery f.o.b. has not been taken by the Imperial Government, and is accordingly the care of all factories concerned.

PAYMENT.

Payment is made on the receipt of grade-notes and specifications through the dairy associations at the various shipping-ports throughout the Dominion. An advance representing 90 per cent. of the value of the cheese is available to factories, free of interest, on submission of debit notes in duplicate accompanied by store warrants and insurance certificates, to the Dairy-produce Graders at the grading-ports. These debit notes are certified as correct by the Graders if otherwise in order, and are forwarded to the Department of Imperial Government Supplies, by-whom payment is remitted within twenty-four hours after receipt.

Difficulty is occasionally caused through the failure of factories to render claims for advances to the proper quarter, and in many cases through their omission to render any claims at all; and as it is in the majority of instances impossible for the Department to ascertain at time of shipment whether the cheese shipped has been actually advanced against, the practice has been adopted of withholding portion of the proceeds of each shipment in all cases where advances are outstanding against the factories concerned, although in some cases cheese may be shipped which has not been advanced against. If any inconvenience is caused to factories as a result of this practice, the remedy clearly lies in their applying for advances on all cheese delivered to grading-stores, and if that practice is faithfully followed the action of the Department in withholding advances from proceeds of shipments will cause no difficulties.

Payment is in all cases made on actual cheese weights as determined by the Grader, less a deduction of 2½ per cent. for shrinkage.

SHIPMENT.

Shipment is arranged in steamers provided by the Imperial authorities through the London Tonnage Committee, acting in conjunction with the New Zealand Overseas Shipowners' Committee, Wellington, and allotments of space by the various steamers made available are undertaken by the committee referred to on the basis of the requirements at the various shipping-ports.

STORAGE.

If the average period during which the whole of the cheese supplied by any factory to the Government has remained in grading-store prior to shipment exceeds three calendar months, storage charges for the excess period at rates not exceeding those current on 1st January, 1918, will be paid by the Imperial Government. This provision means that the shipments by all factories throughout the season will be averaged in order to ascertain the average period during which the cheese included in each shipment has remained in store, and if that period exceeds three months the excess will be paid by the Imperial authorities.

III. BUTTER.

The present (1917-18) season is the first for which the Dominion's output of butter has been purchased by the Imperial authorities, and the price paid has been fixed at 157s. per cwt. for creamery butter, with a deduction of 6d. per cwt. for each half grade-point by which the butter falls below first grade.

Whey butter and dairy butter are purchased at 133s. 8d. per cwt. and miled butter at 124s. 4d. per cwt., these two latter figures being subject to a deduction in each case of $\frac{1}{2}$ d. per lb. for any second-grade butter.

PAYMENT.

Payment is made on the basis of delivery f.o.b. ocean steamer, and on receipt of the relative grade-notes through the dairy associations effecting shipment payment is made by the Department within the course of a few days after receipt.

An advance of £3 10s. per box is made in respect of creamery butter which has been in store for a period of not less than twenty-eight days, of £3 in the case of whey and dairy butter, and of £2 15s. in the case of miled butter.

Advances should be claimed by factories by submitting debit notes in duplicate, accompanied by store warrants and insurance certificates, to the Dairy-produce Grader at the customary grading-ports. After being verified by the Graders these debit notes are forwarded to the Department of Imperial Government Supplies, by which payment is made within twenty-four hours after receipt.

The same remarks as made in regard to cheese shipments and the deduction of advances from the proceeds thereof apply equally to butter shipments, and factories will find it advisable to claim advances in respect of all butter delivered to grading-store which remains there for the required period.

INSURANCE.

Insurance of butter up to the point of delivery f.o.b. is the responsibility of factories concerned, and from that point is accepted by the Imperial authorities.

WEIGHTS.

Factories are required to supply creamery, whey, and miled butter in boxes containing $56\frac{1}{2}$ lb., including the weight of the enveloping parchment, and in cases where the weight ascertained by the Grader falls below $56\frac{1}{2}$ lb. a proportionate reduction is effected over the whole number of boxes included in the shipment, based on the number of boxes weighed by the Grader. In the case of dairy butter the weight contained in each box, including the weight of the enveloping parchment, must be $\frac{1}{2}$ lb. in excess of the weight marked on the box, and adjustments for short weights are made on the same basis as explained above.

STORAGE.

If the average period during which the whole of the butter supplied by any factory to the Government has remained in grading-store prior to shipment exceeds three calendar months, storage charges for the excess period at rates not exceeding those current on 1st January, 1918, will be paid by the Imperial Government.

VALUATIONS OF SEEDY WOOL.

TAKING advantage of the presence in Hawke's Bay of the Chief Supervising Wool-valuer, a conference—or, rather, round-table talk—of wool-growers' representatives, brokers, Supervising Valuers, and an officer of the Imperial Government Supplies Department was held at Napier on 14th January to discuss the much-debated question of valuations of seedy wool. Perusal of a report of the meeting which has been issued suggests that similar talks in other districts where complaints have been made would go far to remove any grievances or misapprehension regarding the valuations on the part of growers having seedy wool. The report makes it clear that no instructions have been given to valuers to take into consideration the cost of carbonizing or extracting the seed by any other means. The matter was put into a nutshell by the Chief Supervising Valuer (Mr. Walter Hill), who stated, "Valuers arrive at present-day values by making deductions as to the proportion of seed and foreign matter, and, after making allowance for the defects caused by the presence of seed, put on such a price as will bring the

clean wool to an approximate relative cost of A grade wool when scoured. When making valuations the condition or quality of the wool is taken into consideration, but not the cost of taking the seed out."

It is obvious that the presence of seed (piripiri) will have some deteriorating effect on the wool. When the wool is examined it is evident in many cases that growth has been interfered with, and the part carrying, or that has carried, heavy seed is usually "shorter" than the rest of the fleece. In the case of lambs' wool, that carrying excess of seed is practically always found to be "short." Whether this is caused by the seed, or whether the presence of the latter induces the owner to shear before the wool is grown, is not always clear. The result is the same in either case—short wool is of considerably less value clean than wool of reasonable length. The seed also discolours the wool, and even if the length is there the discoloration seriously detracts from its value, and brings the price relatively lower than would be paid for well-grown clean wool of good colour.

When the schedule of prices to be paid for wool was agreed upon it was realized that there would be variations, and that *pro rata* prices would be paid for "very superior" and "very inferior" grades. It would be impracticable to fix a maximum and minimum owing to the varying condition in which wool is marketed. In most auction sales in pre-requisition days there were lines of wool for which there was no competition, and for which apparently ridiculous prices were bid and accepted. The causes for this were many: sometimes the buyer may have been at fault, but more frequently the condition of the wool was answerable for the small demand and low prices for these lines. Under the present purchase scheme valuers' instructions are to give fair value for all lines submitted in accordance with the schedule of prices fixed, but they must take into consideration defects in any degree. It may be said in general that inferior wools are now receiving fairer and fuller values than perhaps ever before. The very badly seeded lines of fleece-wool received for valuation this season are really comparatively few.

Growers are advised not to pack "very seedy" wool with "slightly seedy," as the difference in value is considerable. Heavy seediness causes deterioration in many ways; slightly seedy does not affect the value seriously. Careful skirting and classing in general will pay the grower just as well under the present purchase system as in the past.

ESTIMATED YIELDS OF WHEAT AND OATS.

THE following estimated average yields of wheat and oats for the current season (1917-18) have been compiled by the Government Statistician from reports furnished by the Fields Inspectors of the Department of Agriculture:—

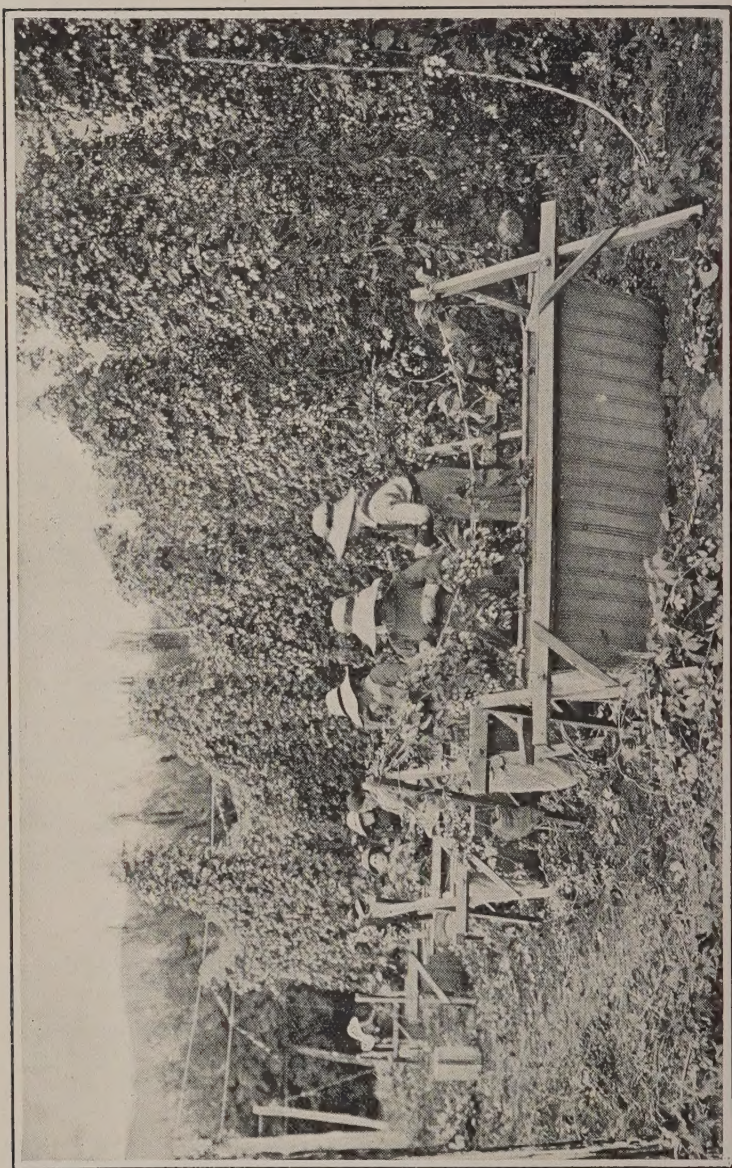
	Bushels per Acre.			Bushels per Acre.	
	Wheat.	Oats.		Wheat.	Oats.
Auckland	.. 27'26	31'40	Marlborough	.. 22'05	35'64
Hawke's Bay	.. 25'47	30'17	Canterbury	.. 27'04	30'31
Taranaki	.. 21'58	30'23	Otago ..	.. 29'92	39'57
Wellington	.. 24'59	30'59	Southland	.. 30'00	42'38
Nelson	.. 22'90	31'99			

Average (estimated) for Dominion, season 1917-18 .. 27'35 35'26

Average (actual) for Dominion, season 1916-17 .. 23'19 30'26

According to the foregoing estimates, taken in conjunction with the acreage grown, the total yield of wheat for the Dominion should be approximately 7,800,000 bushels, as against an actual yield of 5,051,227 bushels in 1917. The yield of oats is much harder to estimate, as the proportions of the harvest respectively threshed and chaffed depend to a great extent on market conditions. In 1916-17, 31'44 per cent. of the oat crop was threshed, and if the same percentage obtains this year the yield of grain should be approximately 5,368,000 bushels. The oats threshed last season yielded 5,371,436 bushels.

Orders in Council dated 31st January, 1918, prohibit the exportation from the Dominion of live pigs, also of manures of every description, save with the consent of the Minister of Customs.



Hop-picking in Nelson.